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THE PLANT DISEASE REPORTER

Issued By

THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

AGRICULTURAL RESEARCH ADMINISTRATION

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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station — Beltsville, Maryland
Volume 32 — May 15, 1948 — Number 5

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THE RESEARCH AND MARKETING ACT CROP PLANT DISEASE FORECASTING PROJECT

Paul R. Miller

Introduction

"With the passing of the years it became more and more evident that the fight of the American farmer against plant diseases, even with the best weapons science could devise, would never attain maximum results without the aid of an effective Nation-wide plant disease information and forecasting service." -- H. P. Barss (1947 Annual Report to Chief of Office of Experiment Stations)

"In a sense, all bacterial and fungous diseases of plants are at times erratic in behavior in the field and in the laboratory. The underlying nature and cause of the erratic or sporadic occurrence of disease comprises one of the important problems of pathology in need of more intensive and extensive investigation." -- James Johnson (Wisconsin Agr. Exp. Sta. Res. Bul. 160. 1947 -- p. 32).

These two quotations define, very accurately, the two parts of the plant disease control problem combined in the crop plant disease forecasting project. First is the research on the fundamental epidemiology of the diseases concerned, with the immediate purpose of developing a basis for surer anticipation of outbreaks, and the ultimate aim of determining patterns of disease occurence in relation to all the contributing factors and their variations, combinations and interactions, i.e., of explaining why diseases "explode" in some years and are almost completely absent in others. Secondly, the reporting and warning service is established to enable the economical and effective use of control measures when they are needed and to prevent unnecessary waste when they are not needed. The forecasting service will make use of the knowledge developed by the research program as promptly as it can be applied to definite situations.

I believe that a brief explanation of the background and operation of this forecasting service will be of interest to readers of the Reporter, although most of them probably already possess some general knowledge about it.

Background of the Forecasting Project

The project "To establish facilities for forecasting the development of crop plant diseases," to be conducted by the Plant Disease Survey, was authorized under the Research and Marketing Act and is now functioning as a warning service for late blight (Phytophthora infestans) of

potato and tomato, blue mold or downy mildew of tobacco (Peronospora tabacina), and downy mildew of cucurbit crops (Pseudoperonospora cubensis).

The Research and Marketing Act was designed to support basic agricultural research, with the aim of promoting " . . . a sound and prosperous rural life as indispensable to the maintenance of maximum employment and national prosperity." Provisions under which the crop disease forecasting project was authorized relate to the improvement of production on farms, under the subtitle "Reducing Hazards on Farms." The reasoning underlying its establishment is obvious to plant pathologists, viz.: Diseases constitute one of the chief hazards affecting crop yields, and checking loss from disease is fundamental to reducing farm risks. Accuracy in judgment as to probability of occurrence and damage would reduce waste and increase efficiency in the use of known control measures during any one season. Such accuracy depends primarily on the extent of knowledge concerning the factors involved in the appearance, distribution, spread, and importance of the disease; secondly, on the accuracy and completeness of the reports on its current development.

The project grew out of certain specific forerunners, well known to plant pathologists, that demonstrated the validity of these arguments conclusively. Shortly before, and during, the War the Northern Mississippi Valley Plant Pathologists War Committee conducted a warning service for potato late blight, with results reported by Melhus as protecting a considerable part of the crop from the disease in that region in those epidemic years. During the War the Emergency Plant Disease Prevention program of the Plant Disease Survey acted as a warning service for plant disease occurrence throughout the country, as well as a "spotter" for allocation of the very scarce fungicidal chemicals.

Pathologists in Atlantic Coast States where cucurbit downy mildew is important and widespread established an informal committee to report developments to each other during the season, and felt that the advance information gained from these reports was helpful in controlling the disease. In a similar manner, the occurrence of tobacco blue mold was watched and reported by pathologists in tobacco-growing States.

The most influential single plant disease event leading to the establishment of the forecasting project was the unprecedented tomato late blight epidemic of 1946, which was a thorough lesson on the effects of lack of information concerning the probable development of an explosive disease situation. It was so devastating and caught growers as well as pathologists so completely unprepared that it brought the demand for an effective, organized forecasting service to a head. The concerted demand was expressed in resolutions adopted in November 1946 at a special Tomato Conference of pathologists and canners called by the National Canners' Association at Indianapolis, and in December 1946 by

the Plant Science Technical Committee at Chicago and by the American Phytopathological Society at Cincinnati. Briefly, the resolutions all asked for the authorization of a reporting and warning service, while that of the American Phytopathological Society suggested a research program also to support the forecasting service.

The 1947 Tomato Late Blight Warning Service was established as a direct result of the demonstrated need and the evident demand for it. It covered 32 States in the Eastern part of the country, including all States east of the Mississippi River, and Minnesota, Iowa, Missouri, Arkansas, Louisiana, and Texas west of the River. Its successful operation was definite proof of the practical benefits from such a service, and was a deciding factor in the authorization of the Research and Marketing forecasting project.

Scope and Current Activity

The important new feature about the Research and Marketing Act project is the attack on the plant disease control problem from a regional standpoint and from both research and farm practice angles. It represents the first large scale but at the same time fundamental and intensive study of a disease in action under all sorts of conditions. Its work will be concentrated, at any one time, on the current disease problems for which this combined study and application seems likely to obtain the best, or even the only effective, solution.

What the project is authorized to do is delimited by its title and the statement of its objectives, as follows:

The project title: "Establishment of facilities for forecasting the development of crop plant diseases."

Object of work: "To obtain by intensive field work, in cooperation with the State Agricultural Experiment Stations and others interested, accurate data on the occurrence and distribution of economic crop diseases and to search for new and threatening diseases or dangerous outbreaks of established diseases; to study the factors involved in epidemic outbreaks, the damage caused by plant diseases and means of appraising it, the transmission of important plant pathogens from one area into another with special reference to greater probability of spread by man or by insect vectors resulting from increased high-speed long distance transportation facilities; and to establish a warning service so as to permit setting up effective control or prevention programs in the various States to combat or prevent epidemics."

The present concern of the crop disease forecasting service is with determining the probability of occurrence in any one season of certain crop diseases, by means of research on the factors involved, and coordination of accurate reports on appearance, spread, and amount; and

with the issuing of warning letters to be used by the States as a basis for control recommendations.

Certain easily understood considerations limit the extent of its activities, both as to subject and area. In the first place, the funds allotted for the present are not sufficient to undertake the whole program or to cover the whole country in any effective manner. Secondly, the newness of the work requires concentrated effort to establish a reliable basis of experience for effective administration of the warning service and for sound judgment of the suitability of suggested additions. This would be true even without the fund limitation. Therefore, rather than risk unsatisfactory results by spreading our efforts too thinly at the beginning, it was thought best to concentrate in the Eastern part of the country, from the Atlantic Coast States west to North Dakota and Texas, and on the three diseases that had been the subject of some preliminary experience. These three diseases -- to name them again, late blight, tobacco blue mold, and cucurbit downy mildew -- are widespread in the Eastern half of the country. Appearance and spread of each progresses in a rather definite manner during a season. Enough is known about conditions favoring the development of each disease to allow practical forecasting and to give a starting point for research; in addition, reliable control measures have been worked out for each. Finally, the wide fluctuation in occurrence from one season to another makes these diseases especially suitable to the purpose of the project since routine treatment each year may cost so much in the long run as to overbalance the profits from control in the abnormal epidemic years.

Operation of the Project

A logical and practical geographical basis for the work of the project was established by grouping the States included into the three regions: Northeastern, with Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, New York, Connecticut, Pennsylvania, Ohio, West Virginia, Delaware, Maryland, and New Jersey; Southeastern, with Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas; and North-central, with Missouri, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Nebraska, and Kansas.

One State Experiment Station is designated to be the headquarters in each region. At present these headquarter stations are: for the North-central, Ames, Iowa; for the Southeast, Raleigh, North Carolina; for the Northeast, Newark, Delaware. The headquarter stations furnish facilities for the research work. However, all States within the regions should share equally in the planning and in the benefits derived from the cooperative work.

The research work is conducted by a field pathologist stationed by

the Survey in each region. He plans his work in consultation with pathologists in his region, not only at the headquarter station, but in the other stations as well. The Survey is responsible for the basic planning of the regional programs and for their coordination. The States furnish the background of local knowledge based on long time experience of soils, climates, varieties, etc., without which much time would be spent on preliminary studies.

The Warning Service conducted by the new project functions in the same way as the 1947 tomato late blight Warning Service. It operates through key pathologists (in some States the same man for all three diseases; in others different key men for each one) designated to work with it in each State and in each cooperating Province in Canada. The key men send brief reports on essential facts such as dates and places of earliest appearance, weather of past week, spread of disease to new areas, and losses incurred. The reports are assembled by the Plant Disease Survey into a warning letter and transmitted immediately to the State key reporters. A copy of the warning letter is furnished also to the Agricultural Insecticide and Fungicide Association, in order to facilitate prompt distribution of these reports to interested members of the industry and thus make possible the most advantageous allocation of fungicides, both as to place and time.

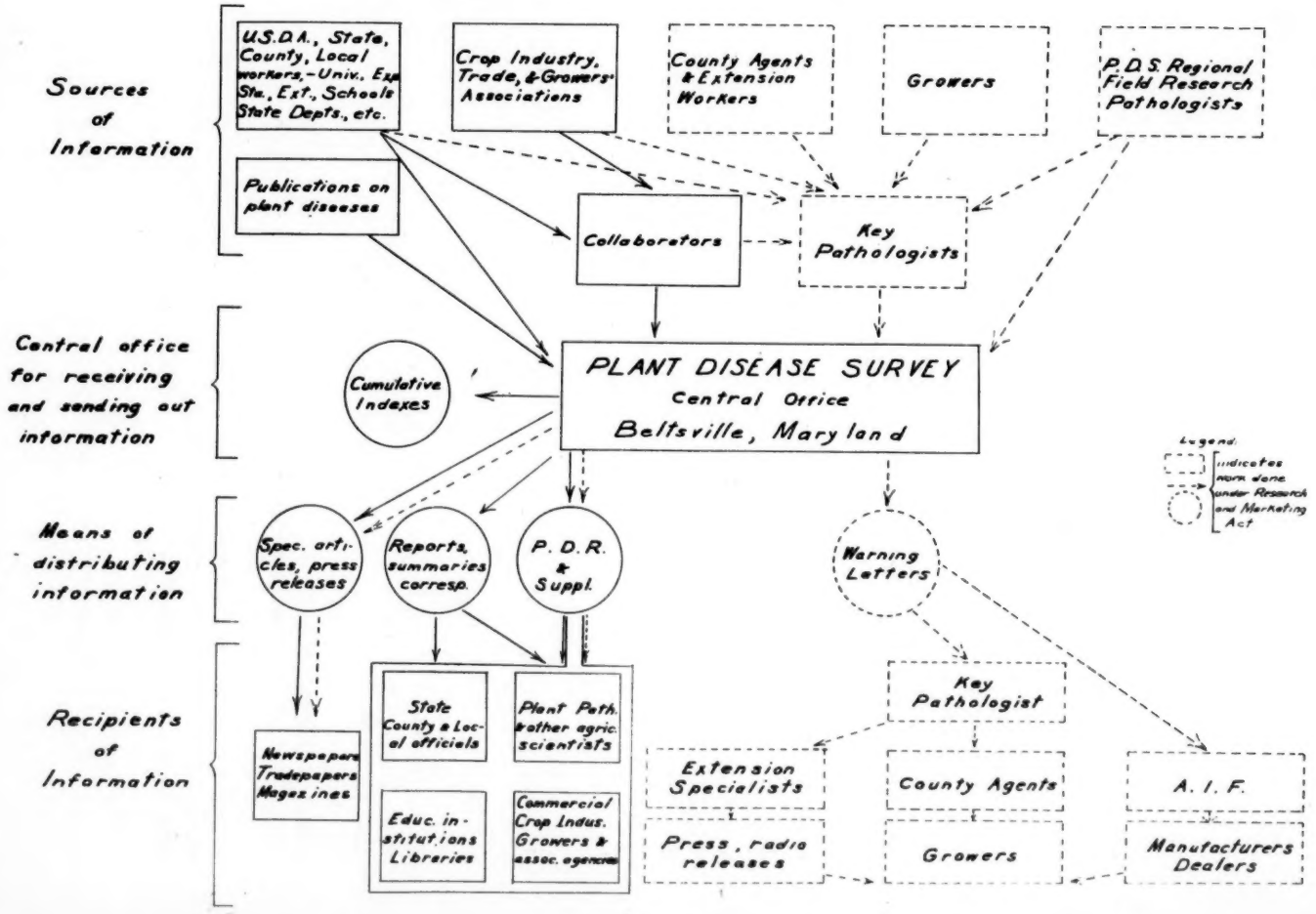
The method of obtaining information is left entirely to the key pathologists. Anyone in a position to make helpful observations on any of these diseases should report directly to the key man in his State rather than to the Plant Disease Survey. The key pathologists also are solely responsible for making this information promptly available in their States and for issuing control recommendations.

Since the key men are responsible for the use made of the Warning Service in their States, the mailing list to receive the warning letters is restricted to them and to a few other authorized persons, mostly interested Federal or State pathologists and the AIF Association. The key men should be applied to for information pertaining to conditions in their respective States, whether such information is wanted for news articles, radio items, or for any other purpose. The Survey cannot undertake to furnish such material directly.

Summaries of the progress of each disease during the season will be published from time to time in the Plant Disease Reporter.

Reference to the accompanying chart, on which the Warning Service is shown in broken lines, will clarify the work of the project, and its connection with the regular work of the Survey.

PLANT DISEASE INFORMATION SERVICE
as conducted by
THE PLANT DISEASE SURVEY



Possible Extension of Activity

Clearly, the content of such a project as this cannot remain static; on the contrary, the work must vary according to the need and it must be responsive to changing requirements.

The epidemiological studies on any one disease will be terminated when the factors involved in the activity of the organism and its interrelation with environment and host have been determined, and a practical program for predicting occurrence has been worked out. Therefore, although the forecasting service itself will continue on a basis determined by need, experience and research, the research program must constantly look forward to change in its specific objectives.

The crop disease problems of the West are no less important than those of the East in their effects on farm welfare and national economy. However, the chief disease problems of the two sections differ because of different agricultural conditions, and the Eastern experience of forecasting will not necessarily fit Western requirements. There has been no similar experience with Western diseases.

Additions to the work of the project can be made only upon convincing demonstration that the new work is urgently needed and that it can not be handled so well in any other manner. Careful study will be necessary to discover problems serving the most definite need and likely to produce the widest benefits, not only for Western conditions but also for future work in the East. State pathologists can give invaluable aid if they will search their own experience for suitable material.

Conclusion

The correlated regional research on epidemiology has not been attempted before from the standpoint of the forecasting project and it should give results, both in methods and in basic information, that will be helpful generally in similar studies.

In addition to aiding its own field of plant pathology, research conducted under this project will make contributions to and receive aid from investigations on agricultural climatology (weather patterns in relation to disease), as well as statistical inquiries and studies on farm risks and agricultural crop insurance (sampling methods, loss appraisal).

By means of the forecasting service, farm practice will benefit from a fundamental change in attack on the disease control problem. Advantages to growers of a practical forecasting service are obvious. It will remove one source of uncertainty, make income more stable, and avoid wasted effort, time, and money. During seasons when the diseases are inactive it will save money; when the diseases are rampant, it will save crops. In both cases it will save energy.

From the national standpoint, the removal of important crop hazards will have a stabilizing effect. Direct effects of crop failures from this cause on the population as a whole, manifested in high prices or in inability to obtain needed food products, will be much less likely. This aspect might sometimes be very important, especially in times of national emergency.

In conclusion, we ask each individual pathologist to consider himself an essential part of this project, with his share of official responsibility for the success of its operation.

DIVISION OF MYCOLOGY AND DISEASE SURVEY

PROGRESS REPORTS ON LATE BLIGHT, TOBACCO BLUE MOLD AND CUCURBIT DOWNY MILDEW

(Summarized from reports of Warning Service Key Pathologists)

LATE BLIGHT (Phytophthora infestans). Reports indicate that late blight had ceased to be a factor on commercial tomato crops in FLORIDA generally by the end of March, even though control was applied indifferently or not at all in some sections. Weather did not favor an epidemic in tomato seedbeds in the Sanford area, but uniform scattered infection was evident throughout March and the first part of April. Plants shipped to northern areas were reasonably certain to carry inoculum. At the middle of March shipments were going to South Carolina, Georgia, and Alabama. Where Dithane or copper was used the amount of disease was reduced but no grower was doing a sufficiently thorough job to have clean plants.

The fungus was still very active on potatoes in the Everglades and Hastings sections. At Hastings more than 8 inches of rainfall were recorded during a two-week rainy period ending March 13, and weather was mostly favorable for late blight development during the rest of the month and the first half of April. Spread was not rapid immediately after the end of the rainy period, perhaps because of the small number of primary infections present and the use of fungicides on the worst-affected fields before it began. At the beginning of April the disease was general but only a few fields not treated before blight became established in them were killed by it. A disastrous epidemic was prevented by fungicide applications. About half the acreage was treated with enough copper or Dithane each week to prevent blight losses. The disease caused little or no injury in fields sprayed every five to seven days with about 150 gallons of Dithane-zinc sulfate-lime per acre, and was also controlled in fields dusted every three to four days with enough copper dusts to cover each acre with three to four pounds of metallic copper once a week. Fungicides used, besides the Dithane spray, include Tribasic Copper, Copper Compound A, and C-O-C-S.

In LOUISIANA, late blight was found in one ten-acre potato field in Terrebonne Parish, March 30, and in one small potato planting at Baton Rouge, April 8. These are the only occurrences of late blight recorded in the State this spring. Weather conditions have not been favorable to the disease, with relatively little rain and sunshiny, windy days.

TOBACCO BLUE MOLD (Peronospora tabacina). In GEORGIA blue mold spread has been continuous but overall damage has been negligible, the only serious plant loss occurring in the small percentage of untreated beds attacked in early February. Most growers treated their beds regularly with Fermate. Little of the crop had been set out because of wet fields, and some of the plants had become too large to use.

Scattered beds of cigar-wrapper tobacco showed blue mold in Gadsden County, FLORIDA, but only one case of serious damage was noted. Good control was achieved in spite of frequent rains, by almost daily applications of Fermate dust or of Isotox and fungicide combination. A considerable amount of leaf distortion was attributed to excessive application of Isotox (high gamma benzene hexachloride diluted to 1.5% gamma), either alone or in combination with fungicide. Transplanting had been delayed by rain and by cold weather which retarded growth of seedlings. No blue mold was found in lower East Coast areas during a quick survey on March 16.

In SOUTH CAROLINA, only one affected bed had been reported, on March 15 in Williamsburg County. Use of Fermate checked the disease. Stands were generally good but plants were small for the time of year, growth having been slow because of continued rains and cold weather.

In NORTH CAROLINA the disease was first found March 23 in a Columbus County bed during a period of warm weather. By April 2 it was found at several other locations in Columbus County, and in adjacent Bladen County. On April 1 it was found in Wake County, on two farms in several scattered beds, both cases on old bed sites, one of which had been treated last fall with the Uramon-Cyanamid combination treatment. This is about 100 miles from the Bladen County locations and the disease probably was present at places between. Most cases observed so far have been on old bed sites.

DOWNY MILDEW OF CUCURBITS (Pseudoperonospora cubensis) was prevalent on cucumbers in several FLORIDA sections. It reached epidemic proportions in the Fort Lauderdale-Pompano East Coast area during the first week of April. On the West Coast infection varied from moderate to very severe at the end of March. Here, growers with adequate spraying machinery had very little disease; others using hand-operated equipment were losing their plantings before the crop was set. The disease was active in the Webster and Mascotte areas from the middle of March, increasing in severity toward the middle of April, when it started to kill the plants in poorly dusted fields. In this section copper-zinc-lime dust was giving better control than Parzate but much copper burn was evident. The disease was observed to be severe on cucumbers at Wauchula and Arcadia also. Up to the middle of April no downy mildew had been reported on watermelon plantings.

DUSTING BEANS AGAINST APHID VECTORS FAILED TO GIVE ECONOMIC CONTROL OF YELLOW BEAN MOSAIC [1]

S. E. Crumb Jr.[2] and F. P. McWhorter[3]

In the summer of 1946 a trial plot of beans was planted near Eugene, Oregon, by a cooperator, Mr. F. Bartholemew. A portion of the trial plot was adjacent to a field of red clover that was 95 percent infected with yellow bean mosaic (Diagram 1) and infested with several species of insects considered potential vectors of the virus. These were:

Cicadellidae:	Deltocephalus vanduzeei Gill. & Bak.
	Draeculacephala crassicornis V.D.
	Colladonus montanus mulsus Ball
	Dikraneura carneola Stal.
	Euscelis maculipennis DeL. & D.
Cecropidae:	Philaenus leucophthalmus
	vars. fabricii V.D.
	spumarius Fall.
	pallidus Zett.
	new var. DeL.
Miridae:	Lygus sp.
Chrysomelidae:	Diabrotica unidecimpunctata Mann.
Aphididae:	Macrosiphum pisi (Kltb.)

Later greenhouse experiments on transmission eliminated all except the pea aphid (M. pisi) as probable vectors. While the pea aphid was abundant on the red clover, it did not colonize on the beans at any time during the period of the experiment.

Aphicides were applied to the trial plot to determine their effect on natural spread and development of the virus.

Methods

1. Planting Plan - The plot consisted of thirty-five rows of beans, each approximately fifty feet long. Beginning with row one the first two rows were left as controls, the next four were treated, the next two left as controls, etc., thus alternating two control rows and four

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[1] Published as Technical Paper No. 552 with the approval of the Director of the Oregon Agricultural Experiment Station. Contribution of the Departments of Entomology and Plant Pathology.

[2] Assistant in Entomology, Oregon Agricultural Experiment Station.

[3] Plant Pathologist, Oregon Agricultural Experiment Station.

treated rows for thirty rows (see diagram). The remaining five rows were treated irregularly and are not considered in this report.

2. Dusting Plan - The treated rows were dusted with a proprietary material stated to contain 3.6 percent nicotine alkaloid, 50 percent sulfur and 46.4 percent inert materials. Dusts were applied either in the evening or early morning, according to the occurrence of propitious weather for dusting.

The first dust was applied June 11 and further applications were made at weekly intervals thereafter until July 9. This period for application of the insecticide was chosen because McWhorter and Boyle[4] have shown that most of the natural spread of the disease occurs at two periods of growth, when the plants are 3-6 inches tall and 18-20 inches tall, respectively.

3. Data - The accompanying chart shows the development of the disease in the control and treated rows. This chart also shows the distribution of disease as affected by direct exposure to the adjacent field of red clover.

Discussion

After the first week only a few pea aphids were found in the planting. Weekly counts of insects proved that pea aphids at no time colonized on the beans, supporting the previous observation of McWhorter and Boyle. Since the incidence of the disease was high, it would appear that most of the infections occurred very soon after the beans emerged. A few aphids transmit the disease to a relatively large number of plants within a comparatively large area.

The bean aphid, Aphis rumicis L., was never found to be abundant in the field, and those few were taken in July after field infections had occurred. Later greenhouse experiments proved the bean aphid to be an excellent vector of the virus, however. Since this aphid is known to colonize on beans commonly in Oregon, it cannot be ignored as an agent of secondary spread under our conditions. It is not commonly taken on clover or alfalfa in Oregon.

The potato aphid, Macrosiphum solanifolii (Ashm.), another known vector of yellow bean mosaic[5] was never taken in this planting.

Another observation is that incidence of infection was reduced approximately 50 percent as a result of the weekly treatments. However, this reduction cannot be considered economic control of the disease, since there were enough infections remaining to establish the disease

[4] McWhorter, F. P. and L. Boyle. 1946. X-Disease and Other Forms of Yellow Bean Mosaic in Western Oregon. Oregon Agr. Exp. Station Circ. Infor. 379, 6 pp. (mimeo).

[5] Pierce, W. H. 1934. Viroses of the Bean. Phytopath. 24:87-115.

DIAGRAMMATIC SUMMARY OF DATA

Row Number			Percent Infected Plants
1	Control		53
2	Control		54
3		Dusted	45
4		Dusted	46
5		Dusted	61
6		Dusted	58
7	Control		62
8	Control		63
9		Dusted	40
10		Dusted	40
11		Dusted	27
12		Dusted	21
13	Control		83
14	Control		49
15		Dusted	26
16		Dusted	15
17		Dusted	11
18		Dusted	17
19	Control		32
20	Control		38
21		Dusted	15
22		Dusted	23
23		Dusted	11
24		Dusted	22
25	Control		46
26	Control		39
27		Dusted	25
28		Dusted	14
29		Dusted	17
30		Dusted	26

Infected Red Clover

Lane

Filbert Orchard

Prevailing winds

N

Average Percent Infected Plants - Dusted Rows.. 28
Average Percent Infected Plants - Control Rows. 52

effectively in the field.

It was assumed that the aphids would be wind-borne into the first few rows of the field and that they would be much less numerous in the portion of the plot farther from the clover. Actually, 49 percent of the plants in the adjacent 15 rows were infected and 23 percent in the remaining rows. These percentages indicate a more general scattering of the vectors from the clover field than had been anticipated, especially since the south portion of the field was protected from prevailing winds by a filbert orchard.

OREGON AGRICULTURAL EXPERIMENT STATION

RED SPOT MOSAIC OF OATS[1]

H. R. Rosen

Since 1942 a disease of oats has been observed in Arkansas on Traveler and a number of other varieties and selections of oats, growing alongside of still others which appeared to be free from the malady. Repeated attempts to isolate a causal microorganism have failed so that the etiology remains uncertain. However, since symptoms and field behavior indicate a virus or group of viruses, this preliminary description is reluctantly offered at this time, despite lack of positive evidence for virus etiology, so that control measures may be initiated. Such measures are now available in the form of resistant varieties and selections.

Symptoms. Unlike the two oat mosaics so well described by McKinney (Phytopathology 36: 359-369, 1946), the usual and characteristic symptom under field conditions is a red spotting and mottling of the leaves. Such leaves tend to die prematurely. As they become decadent, they lose a considerable part of the anthocyan pigment and appear light reddish-brown or yellowish-brown in color, the brown predominating. On some varieties and selections, as Coker's Fulgrain Str. 8 and selections from Coker's 32-1X (Victoria-Richland), the red spotting appears most often at the apical ends of the blades while on others, as on Traveler, it may appear on any part of the blade or sheath. On the latter variety the discolored areas vary from minute ill-defined dark dots, dashes, and streaks to relatively large (1 to 2 cms. in length and up to 5 mms. in width), usually well-defined reddish spots or streaks with darker, reddish-brown centers and occasionally with very definite margins of intense purple-brown color. In general appearance, some of these spots are quite comparable to the ring spot mosaics of various plants but unlike McKinney's eyespot-mosaic, they are not fusiform in shape, are much more limited in number, and are much larger. In color most of the larger spots are comparable to Ridgway's flesh pink, shrimp pink, or vinaceous-pink, although darker shades are not rare.

When the leaves bearing such spots are placed in moist chambers, the red color of the spots is gradually replaced by a pale yellowish color and in time various fungi are to be observed sporulating on some of the spots, Hormodendrum being a fairly common concomitant.

The first indication, presumably the earliest symptom, is a very faint mottle or fleck which is best observed by holding the blade up to the light. This develops into a minute dark dot or dash which often

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[1] Research Paper no. 858, Journal Series University of Arkansas, Fayetteville, Arkansas. Published with the permission of the Director, Arkansas Agricultural Experiment Station.

runs into neighboring ones and when this occurs, a conspicuous spot appears. Compared with the earliest symptoms of Helminthosporium leaf spot (Pyrenophora avenae), these dots and dashes are never so well-defined, never so dark, and usually much more minute. When they remain isolated they appear as dark, very small, ill-defined flecks with little or no red pigment. They are usually more conspicuous on the lower (dorsal) side of the blade than on the upper. Compared with spots produced by the Helminthosporium blight organism (which Meehan and Murphy have named H. victoriae but which the writer prefers to consider as a variety or race of H. sativum), these dots and dashes involve little or no collapse of tissue and are not depressions as are localized spots of Helminthosporium blight.

When diseased plants are carefully dug with a ball of soil around the roots, the soil washed away, the roots immersed in water, and the plants kept in a laboratory at about 65° F. with subdued northern daylight, within 48 hours they will lose part of the red color of the spots. This color is gradually replaced by yellowish pigments, and plant symptoms in general partake more and more of the typical mosaic virus expressions. These include chlorotic streaks (but not the dots and dashes described by McKinney) often beginning at the apex and extending one-third or more of the length of the leaf. In addition there is a pronounced mottling or "mosaic" of lighter and darker green areas, the darker green apparently replacing the minute dark dots and dashes observed under field conditions. Likewise, there are islands of dark green surrounded by chlorotic areas. Unlike field symptoms, those developed in the laboratory are much more recognizable as those commonly associated with viruses. When resistant varieties or selections from the same crosses are handled in the same way as the susceptible ones, no such symptoms appear.

Another marked difference between field symptoms and those observed under laboratory conditions involves the number of leaves with mosaic symptoms. Under field conditions, it is rare to find more than 50 percent of the foliage affected while under laboratory conditions the symptoms within a few days gradually spread over all or nearly all leaves. Likewise, while field symptoms usually remain more or less localized on each blade, in the laboratory they commonly spread over most of the blade. Within three to four days the plants kept in the laboratory will show fully 90 percent of the leaves markedly chlorotic while the resistant plants under the same conditions remain healthy looking with dark green foliage.

Importance of the Disease. While a few plants of Traveler and other susceptible varieties with careful search can be found to remain stunted, failing to produce shoots, and remaining in the rosette stage until their death, field observations of this disease during the past seven years indicate that compared with some other diseases, it is not important economically on the varieties grown at present. When observed

on susceptible varieties of winter oats in the spring, March and early April being the usual period for most disease expression, it looks devastating. There are so many dead and partly dead-looking, red leaves that a crop failure seems certain. Then as weather permits rapid growth, a field which in early March appeared doomed, will a month later present a picture of thrift and well-being and such fields have in some instances produced over 90 bushels of oats to the acre. In this respect, red spot mosaic of oats is very comparable to quite a number of graminicolous virus diseases that McKinney has investigated and in which he attributes the change from extreme disease expression to healthy growth as associated with difference in temperature. Nevertheless, it would be unsafe to assume that losses are negligible or that, given varieties more susceptible than those commonly grown at present, the disease will remain unimportant.

Disease Prevention. In view of the possible harmful effect of this disease even on varieties now grown, it seemed desirable to attempt to control it. Since 1942 it has been observed that single plants could readily be found in a field of Traveler or other susceptible variety which showed no signs of the disease when others around it were affected. Such disease-free plants were harvested separately and the progeny of some of them increased. One such line, Traveler 15, first grown as the progeny of a single plant selection in 1943, has a mixed population in which most of the plants appear resistant but with some susceptible ones. Because of this, a single plant, which appeared highly resistant in 1946, was again selected and the progeny of this appears to be uniformly resistant in 1948.

It should be possible this year to obtain fairly accurate figures on losses occasioned by this disease since there is now present in the nursery a number of selections of Traveler and other varieties that are highly resistant alongside of other selections of the same varieties that are quite susceptible. Incidentally, the difference in appearance between susceptible and resistant selections is so great in the spring that other factors, such as low spots in the field, lack of available soil nutrients, aphid infestation, etc., which produce at times symptoms confusingly like red spot mosaic, can readily be distinguished and separated from this disease.

Varietal reactions. Seemingly this disease is not confined to Victoria derivatives, although up to the present it has been observed mostly on such derivatives, including Traveler, Stanton, Letoria and Fulgrain. It has not been observed on DeSoto or Victorgrain. It appears to be present, although apparently in mild form, on most Red Rustproof strains, including Ferguson 922, Nortex, New Nortex, Appler, and selections from these. The winter Fulghums also appear to be mildly susceptible. On the other hand Lee, Custis, and the Winter Turf group apparently are highly resistant. Most Bond derivatives appear to be resistant, although one selection of a cross (Harry Culberson-Winter Fulghum X Bond-Iogold) X Mutica Ukraina is highly

susceptible when other selections from the same cross are apparently resistant.

There is no information on how the disease is introduced or how it spreads. Despite the very fine work of McKinney in showing the soil-borne nature of infection of a number of grass viruses, including two on oats east of the Mississippi, he has been unable to identify any transmitting agent west of this River. Why this River should play such a predominant role in separating soil-borne sources of infection from other sources appears to be one of those virus obscurities that is locked in the bosom of "Ole Man River". At any rate, red spot mosaic has been found in a field of Traveler oats near Nashville, Arkansas, which has been in lespedeza and Bermuda grass during the previous "six or eight years" according to county agent, E. A. Hansen. Furthermore in the oat fields at the main experiment station farm, Fayetteville, during the current, 1948, spring season the disease is quite prevalent on susceptible varieties when there is, so far as known, a complete lack of aphids because of very low winter temperatures, and because there were none observed last fall in these fields. However, it is true that various types of nematodes were present in considerable abundance on the subcoronal internodes and on roots of many oat seedlings last fall, but there is no evidence that these acted as carriers. For the present it is best to forego the pleasure of conjecturing.

AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ARKANSAS, FAYETTEVILLE, ARKANSAS

VARIETAL SUSCEPTIBILITY OF WINTER OATS TO SNOW MOLD (FUSARIUM NIVALE) IN NEW JERSEY

C. M. Haenseler

About the middle of February 1948, immediately following melting of an unusually heavy and long lasting snow cover, a severe case of snow mold caused by Fusarium nivale developed on winter oat variety plots at the New Jersey Agricultural Experiment Station, New Brunswick. Dr. R. S. Snell of the Field Crops Department called our attention to the prevalence of the disease and to marked differences in varietal susceptibility.

On February 19, the diseased oat leaves were watersoaked and matted together by the recently developed cobwebby mycelial growth. By February 21 heavy sporulation of the fungus gave a pinkish color to the crowns of the collapsed plants. No spread to other plants occurred after this date.

On March 6, at which time the dead plants were blanched and flattened to the ground, readings on snow mold prevalence were taken on eight varieties of winter oats, planted in 50 ft. x 6 ft. plots, replicated three times. Records, as shown in the accompanying table, were taken of the number of local infection spots occuring in each plot.

Table 1. Susceptibility of winter oat varieties to snow mold (Fusarium nivale) in New Jersey.

Variety	Approximate number of snow mold spots (3 to 8 inches in diam.) on 50 ft. x 6 ft. plots			
	Replication: 1	2	3	Total for 3 replications
Forkadeer	0	0	0	0
Lee	0	0	0	0
Pioneer	0	0	0	0
Stanton	0	0	0	0
Traveler	20	55	35	110
Winter Turf	0	0	0	0
Wintok	55	100	100	255
C I 4316	0	0	0	0

Fulwin, which was included in a series of single-row, 5 ft. plots of various named varieties and crosses, also proved to be susceptible.

Barley and wheat in adjacent plots showed no infection.

Snow mold caused by Typhula was also more prevalent than usual on lawn grass in the vicinity of the oat plots, as well as on golf greens in the northern part of New Jersey, indicating that conditions were favorable for both the Fusarium nivale and the Typhula graminum snow molds this year.

NEW JERSEY AGRICULTURAL EXPERIMENT STATION, NEW BRUNSWICK, NEW JERSEY

EXPERIMENTAL FORECAST OF WHEAT LEAF RUST IN OKLAHOMA FOR 1948

K. Starr Chester and D. A. Preston

During seven of the past ten years attempts have been made to forecast the development of wheat leaf rust [Puccinia rubigo-vera var. tritici] in Oklahoma. Two of these forecasts were made in May. The

remaining five were made during the first week of April, in time to aid growers in planning their operations in such a way as to avoid the worst consequences of a serious outbreak of rust or to take full advantage of a season of light rust between the time of the forecast and harvest in June.

Two of these seven forecasts were of serious epiphytotics (1938, 1945), one was of abnormally light rust development (1944), and the others (1939, 1941, 1946, 1947) were of no more than normal rust injury. In all cases the outcome in Oklahoma was as anticipated, and usually the condition of rust which was forecast for Oklahoma had its counterpart throughout much or all of the wheat area to the north.

Since 1942[1] the forecasts have been based on an intensive analysis of the overwintering and early spring renewal of leaf rust, correlated with late winter and early spring weather conditions, and an extensive survey the last week of March to determine whether the findings of the intensive study have statewide application. The basis of forecasting lies in the facts: (1) that in Oklahoma the weather from April 1 onward rarely if ever is a limiting factor to rust development, (2) that the principal source of leaf rust in this area is inoculum from overwintered local infections, (3) that the weather in December, January, February, and especially March is critical in determining winter survival and spring renewal of the rust, and (4) that the level of rust intensity on April 1 is the principal factor determining its destructiveness from April till harvest in June, since the number of possible generations of rust increase is limited by time, even though the environment is constantly favorable, and the initial intensity of the rust April 1, the other factors being constantly favorable, will determine the final outcome of the disease.

The 1947 forecast was as severe a test of the validity of leaf rust forecasting as could be wished. In January, 1947 there was a severe freeze in Oklahoma and though the mean temperature was a fraction of a degree above normal the precipitation was only 51 percent of normal; in February both temperature (3.5° F. below normal) and moisture (13 percent of normal) were below normal, and the same was true in March (5.5° below normal; 70 percent of normal). As a consequence, leaf rust, which had been abundant the preceding fall, dropped in intensity to a moderately low level, and the April 1 forecast was "that 1947 in Oklahoma will be a year of no more than normal leaf rust. There is no indication that rust will become seriously destructive, although it may well become fairly abundant as the crop approaches maturity."

From April 1 onward for two months, the period during which rust commonly becomes abundant and causes such damage as it can, Oklahoma was

[1] Plant Disease Reporter 26: 213-217, 1942; Supp. 143, 1943; 28: 280-287, 1944; Supp. 156, 1945; 30: 162-165, 1946; 31: 201-202, 1947.

deluged with rain. In April the State had an average of 193 percent of normal precipitation (6.87 inches) and the central and western divisions, where most of the wheat is concentrated, received 229 percent and 188 percent (8.34 and 5.08 inches) of normal moisture respectively. In May the average precipitation for the State was 143 percent of normal (6.83 inches) and the central and western divisions received 140 and 176 percent (6.81 and 7.02 inches) respectively. The mean temperatures in both months, though slightly below normal, were in the optimum range for leaf rust development (59.0°, 66.5° F.).

It has been emphasized in these forecasts that in Oklahoma April-May weather is not the decisive factor in determining major variations in leaf rust development. Certainly this was true in 1947. Despite the abundance of moisture and favorable temperatures during these months the forecast was fully realized by harvest time, as borne out both by our own surveys and by the reports of numerous authoritative independent observers.

From May 29 to June 2 one of us (D.A.P.) made a preharvest survey of the disease situation in 24 of the principal wheat counties in Oklahoma. At this time most of the wheat was in the dough stage. The average percentages of leaf rust, for these counties, according to the Cobb scale, are given in Figure 1. For the survey area as a whole the wheat showed an average of 33-59 percent leaf involvement with rust, whereas in an epiphytotic year the intensity may reach 100 percent at heading time or shortly after.

At this time, on the verge of maturity of the crop, one-fourth to one-half of the leaf tissue was still green and functioning, and a considerable part of such leaf killing as had occurred was due to Septoria tritici and brown mites, rather than rust. Stem rust [Puccinia graminis] of wheat and oats was very light to absent and was seen only on plants that were practically ripe.

On June 1 the Oklahoma Agricultural Extension Division reported that except for local injury in the extreme southwestern part of the State, leaf rust was less damaging than usual. This was unquestionably one of the major factors determining the 1947 all-time record of wheat production in Oklahoma, of double the 10-year average yield. On June 11, D. G. Fletcher of the Conference for the Prevention of Grain Rust reported only minor damage from leaf rust in Oklahoma, and only light infections in Kansas, where Septoria tritici was doing more damage than leaf rust. On June 12, K. D. Blood, Oklahoma statistician of the U.S. Bureau of Agricultural Economics wrote indicating that leaf rust was apparently at a minimum in the State, judging by the accounts of the Bureau's crop reporters.

The lighter-than-normal occurrence of leaf rust in 1947 extended to wheat fields far to the north. On July 21, D. G. Fletcher reported only

light to moderate leaf rust in the Dakotas and western Minnesota, and on August 15 he summed up the situation for the wheat belt as a whole by saying: "1947 will go down in the records as a non-rust year. Leaf rust in certain areas developed in epidemic form but usually too late to cause severe damage. Septoria generally caused more leaf killing this year than leaf rust."

The heavy rains of the spring of 1947 were followed by a drought that was so prolonged that very little wheat could be seeded at the normal time, mid-September to mid-October, in Oklahoma. Much of the crop was not planted until November or even December. There was little wheat above ground at a time when it might have become infected in the normal manner by airborne rust spores from the North.

Ten-day samplings of 1000 to 3000 leaves each were made from February 1 to March 31, 1948 in an observation plot at Stillwater, planted with a pool of several rust-susceptible wheat varieties. Not once in the seven samplings was a single typical rust pustule found. This has been the only time in our experience in Oklahoma when at least traces of leaf rust could not be found in any field of susceptible wheat in late winter. At the time of each sampling, two other local farm fields of rust-susceptible Pawnee wheat were sampled, one of which was well stooled-out, but they, too, showed no trace of rust. The only rust found during this period was in a small patch of very early planted Pawnee wheat, in the amount of about 1 pustule per 50 leaves on February 1, which had decreased to 1 pustule per 100 leaves by March 2, and 1 pustule per 200 leaves by March 22, with little further change March 31.

On this last date only one doubtful rust pustule was found on 3000 older leaves from the observation planting. Thus, at forecast time the concentration of rust in the observation planting was no greater than one ten-thousandth of the amount present April 1 of the light year 1947, and no greater than one millionth of the amount during the first week of April in the rust epiphytotic year 1938.

As in previous years, the intensive study at Stillwater was supplemented by an extensive survey of conditions throughout the wheat growing counties of Oklahoma. From March 25-30 one of us (D.A.P.) sampled several hundred wheat fields in 25 Oklahoma counties, including all the counties transversed in the survey of May, 1947 (Fig. 1), with the addition of Harmon County. Not a pustule of rust was observed at any point except in the southern part of Tillman County, in the extreme southwestern corner of the State, between Frederick and the Texas line, where there was found an average of nine small pustules per 200 leaves with very few signs of incipient infections.

Throughout the State Septoria tritici has been more damaging than leaf rust, being present in about average amount. Wheat in Oklahoma is quite retarded in development, the plants in some fields not yet having

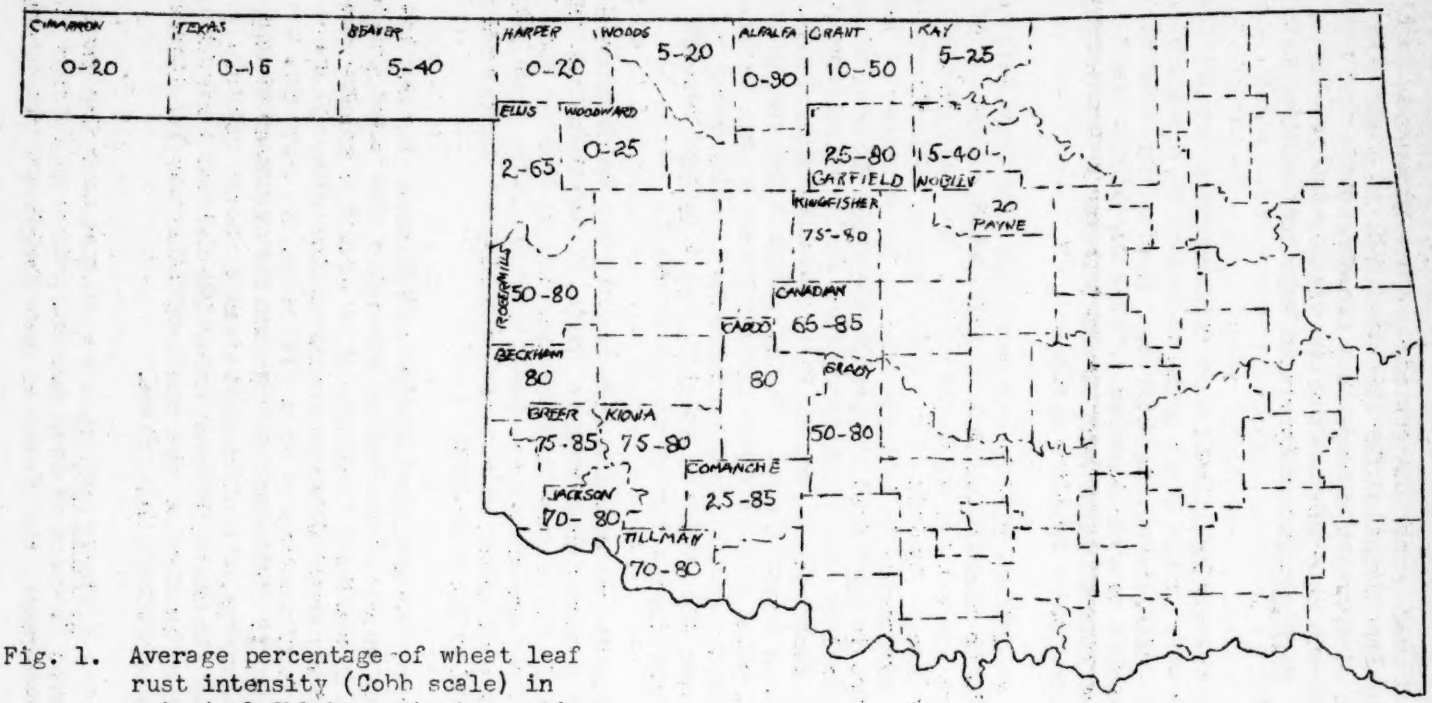

Fig. 1. Average percentage of wheat leaf rust intensity (Cobb scale) in principal Oklahoma wheat counties May 29-June 2, 1947, when wheat on the average was in the dough stage.

begun to tiller. If harvest should be retarded to a corresponding degree the present situation might compare with that of mid-March in a normal year, two weeks before forecast time. Yet the present level of rust is so extremely low that even with two weeks of favorable weather it is highly unlikely that the rust could increase enough to raise its prevalence to a danger point by April 15. Moreover, wheat that is retarded at present could still ripen at the normal time in the presence of the usual hot weather of May and early June.

Taking all of these facts into consideration the prospects for a relatively rust-free wheat crop in Oklahoma appear the best in ten years. Our experimental wheat leaf rust forecast for 1948 is for a season of mild leaf rust, "too little and too late" to seriously damage the Oklahoma crop.

OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE, STILLWATER.

LUPINE DISEASE SURVEY IN THE SOUTHEASTERN STATES

J. L. Allison, J. L. Weimer, Phares Decker,
and James A. Lyle

The acreage planted to blue lupine, Lupinus angustifolius, has increased so rapidly during the past several years that this crop has largely replaced all other winter cover crops in areas where it is adapted Thus far the lack of winter hardiness has restricted its culture largely to the Coastal Plain sections of Georgia, Alabama, Northern Florida, and west to Texas.

During the period from March 8 to March 17, an extensive survey was made throughout the major lupine-growing sections. The principal points visited included Experiment, Fort Valley, Perry, Tifton, Thomasville, and Albany, Georgia; Gainesville, Monticello, and Quincy, Florida; and Auburn, Tallassee, Dothan, and Fairhope, Alabama. In addition to the comprehensive survey in these specific localities, many additional fields along trunk highways were entered and plants examined. Where there was any doubt concerning the identification of diseases observed, specimens were collected and identification was made by Dr. J. L. Weimer on his return to Experiment, Georgia. Mr. Roland McKee, in charge of lupine investigations for the Bureau of Plant Industry, Soils, and Agricultural Engineering, and Mr. George E. Ritchey, in charge of lupine investigations for this Bureau at Gainesville, Florida, accompanied the party. A concurrent survey by Mr. James A. Lyle, Alabama Agricultural Experiment Station, corroborated the findings of the first three named authors and his findings have been incorporated into this report.

Climatological data of the U. S. Weather Bureau indicate that weather conditions have been abnormal throughout the southeastern section of the United States since early November 1947. Heavy rainfall and continued cloudiness have retarded the growth of lupines and no doubt these factors have aided in accentuating the amount of disease damage prevalent. In many fields where disease symptoms were absent, plants were below normal height and lacked their ordinary vigor.

Brown-Spot (Ceratophorum setosum Kirchn.) - The first report of the presence of this disease in the United States appeared in a recent number of the Plant Disease Reporter (PDR 32:133. Apr. 15, 1948). At the time the disease was first found it was not sufficiently abundant to cause appreciable damage. Nothing was then known about its distribution in this country. The present survey, however, has revealed that the disease is not only present in all localities visited but that it is unquestionably the most serious disease present at this time. Since the disease is so new to this country, a brief discussion of its symptoms seems appropriate.

On blue lupine the disease is most abundant on the leaflets, but it also attacks the stems, petioles, blossoms, and pods. The lesions on the leaflets are variable in size, shape, and color. In size they vary from spots just visible to the unaided eye to those with a diameter equal to the width of the leaflet. The lesions tend to be circular, but may be more or less irregular, especially when two or more have merged or where they reach the margin of the leaflet. One rather radical departure from the circular type is a lesion consisting of fine lines that form an irregular pattern resembling a net blotch or the line pattern produced by some viruses. In color the smaller lesions as well as the streaks and the borders of the larger spots approach Vandyke brown to blackish-brown to fuscous-black of Ridgway. The centers of the larger lesions are Dresden brown to raw umber in color. On drying the margins lose the darker color and the lesions become more uniformly Dresden brown. The lesions on the petioles at first resemble the smaller leaf lesions or are more elliptical but later they may involve the entire diameter of the petiole and kill it. Lesions on the stems have their longer diameter parallel with the longer axis of the stem. Stem lesions may be just visible or so large that they include considerable areas and form large cankers resembling those produced by anthracnose. The stem cankers are brownish-black with slightly lighter brown borders. Lesions on the floral parts resemble the small stem lesions in color and size. Pod lesions have not been seen but are described in the European literature.

Yellow and white lupines (Lupinus luteus and L. albus) are not yet grown commercially but are being tested extensively at several experiment stations. These species were severely attacked by Ceratophorum setosum at Monticello and Quincy, Florida, but not at Gainesville. Leaves were more or less thickly spotted with lesions varying in size

from just visible to 4 mm. in diameter. They are typically circular in outline but may be elongate in one direction. The spots are some shade of brown, often approaching Dresden brown but usually somewhat lighter, and have a center varying from mummy brown to almost black. Concentric rings are frequently evident in the larger spots. Lesions extend through the leaflet and are approximately the same color on both sides. Two or more adjacent lesions frequently merge, thereby involving and killing considerable areas of the leaflet. The dead tissue making up the center of the spot may fall out, leaving a more or less circular hole. Stems and petioles are attacked and killed. Large areas of the stem may become involved and extensive brown cankers formed. The fungus may attack the upper part of a stem and work towards the base, killing a large part or all of it, or it may attack the stem lower down and cause large cankers that may girdle the stem. In general the lesions on the yellow and white species are similar in appearance. When examined under a hand lens, however, the concentric rings are more apparent on the lesions on the white than on the yellow.

This disease was found from Experiment, Georgia, south to Gainesville, Florida, and west to Auburn, Alabama, varying in severity from field to field. In many places it was causing considerable defoliation from the base of the plants towards the top. Leaflets not yet fully opened had lesions so small that they could be seen only with the hand lens. The prevalence of the disease in Alabama appeared to be about the same as in Georgia. There was little of the disease at Gainesville, but it was very prevalent at Monticello and Quincy, Florida, where it was doing its maximum damage on the yellow and white species which appear to be more susceptible than the blue.

Botrytis canker (Botrytis cinerea) - This disease attacked and killed parts or all of many plants in some fields at all places visited. Frozen tissue appeared to be especially susceptible but young unfrozen tissue was also attacked. Whole or parts of leaflets and petioles were sometimes killed but the most common type of lesion was the stem canker. For the most part the loss caused by this disease was small.

Sclerotinia canker (Sclerotinia sclerotiorum) - This disease was found at Gainesville and in a few fields in north Florida. At Gainesville it was killing a considerable number of plants in some patches, but for the most part the damage was slight. The disease was rather easily differentiated from the Botrytis canker, which it resembles rather closely, by the white surface mycelium and the black sclerotia in the pith of the affected part of the stem as described previously by Decker.

Root rot (Rhizoctonia solani) - This disease was especially prevalent in a late-planted field at Thomasville, Georgia. Reddish cankers were present on many of the stems just below the soil surface. For the most part the cankers were not sufficiently deep to girdle and kill the stems.

Anthracnose (Glomerella cingulata) - This disease has been doing serious damage in some fields during the autumn months by girdling the stems, usually near the soil surface, and killing the plants. At the time of this survey this fungus appeared to be almost entirely inactive and its presence was positively identified in only a few fields. It seems probable that it will become more active with the advent of higher temperatures.

Southern blight (Sclerotium rolfsii) - Only a few plants were found that had been attacked by this disease.

Nematodes (Heterodera marioni) - Roots of many plants in two fields at Perry, Georgia, were badly swollen as a result of root-knot nematode galls. In one field there was a lack of good inoculation by the nodule-forming bacteria and the plants had made a poor growth and had a yellow color. In the other field the nodulation was good and so were the growth and color. Although no final conclusions can be drawn, the impression was obtained that plants that are well nodulated might make a good growth in spite of the nematode galls.

Winter injury - Many plants in some fields had been killed by freezing. Other plants had been injured and were more or less dwarfed or deformed. Winter killing was not nearly so severe as last year.

DIVISION OF FORAGE CROPS AND DISEASES, U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING; GEORGIA AGRICULTURAL EXPERIMENT STATION; FLORIDA AGRICULTURAL EXPERIMENT STATION; AND THE ALABAMA AGRICULTURAL EXPERIMENT STATION.

DEFOLIATION OF SOYBEANS IN SOUTHEAST MISSOURI CAUSED BY PHYLLOSTICTA GLYCINEUM[1]

James M. Crall

On a survey trip through the soybean growing areas of southeastern Missouri during the period August 18-22, 1947, it was found that numerous fields were affected by a leaf spot causing an appreciable amount of defoliation. The disease was noted in fields in Scott, Stoddard, Mississippi, New Madrid, Pemiscot, and Dunklin Counties. Twenty-eight of 84 fields (33 percent) visited showed some infection. The amount in individual fields varied from very slight to 100 percent infection. In one 10-acre field revisited at time of maturity the crop was a total loss. In a 75-acre field an estimated 30 percent of the plants were severely

[1] Contribution from the Department of Botany, Missouri Agricultural Experiment Station, Journal Series No. 1098.

damaged and an additional 20 percent were less seriously affected. Both Ogden and Arksoy (Ralsoy) varieties, which are widely grown in this area, were susceptible.

The leaf spots were round or oval in shape when small, and occurred both at the margins and irregularly throughout the lamina of the leaflets. Their color varied from light to dark brown with a darker margin. In advanced stages necrotic tissue frequently dropped out resulting in a shot-hole appearance. The larger leaf spots (over 5 mm. in diameter) had a noticeably olivaceous appearance because of the presence of the hyphae and spores of an Alternaria sp. which was present, apparently, as a secondary invader. The spots enlarged to involve the entire blade of the leaflet. Finally the entire leaf was killed, the petiole became a light brown color, and the leaf either dropped off or remained attached to the stem in a dry condition. In cases where the entire leaf was killed, the fungus invaded the stipules and the stem tissue at the leaf scar. The stipules were killed and turned brown. A characteristic dark brown lesion occurred at the leaf scar and often extended a short distance (up to 1 cm.) along the stem. A more superficial streak lesion, light gray to brown in color, and extending from the leaf scar lesion along the stem for 8 to 10 cm., was found less frequently.

In severely affected fields the plants had a characteristic appearance. The ground at the base of the plants was covered with fallen leaves. The leaves remaining on the plants were dry and brown from the base of the plant upwards. Severely infected plants had only a few living leaves at the top and these were heavily spotted. In such fields stem blight (Diaporthe phaseolorum var. sojae) was also commonly present.

Pycnidia of the causal fungus were found abundantly in the leaf tissue of both the small and large leaf spots. In the latter other organisms were generally found, especially an Alternaria sp. Pycnidia were also found commonly on the stipules and rarely on the pedicels and stems. On the stems the pycnidia were produced in the streak lesion described above.

The causal fungus was identified as Phyllosticta glycineum Tehon & Daniels.[2] Pycnidia were globose to slightly applanate, membranous, with carbonous ostiole, and 65-150 μ in diameter. Spores were oblong to narrowly ellipsoid, with rounded ends, continuous, hyaline to slightly smoky, with oil globules present but not conspicuous, 1.8-3.2 x 5.2-7.0 μ (average 2.6 x 6.3 μ), and exuded in cirrhoid masses.

Two species of Phyllosticta have been reported as causing leaf spots of soybean in the United States. P. glycineum Tehon & Daniels[2] was reported on soybean in Illinois. This fungus was described as having

[2] Tehon, L. R. and E. Y. Daniels. Notes on the parasitic fungi of Illinois. Mycologia 19: 110. 129. 1927.

globose to somewhat applanate pycnidia, with ostiole becoming carbonous, and with spores 2-2.5 x 4.5-7 μ and exuding in cirrhi. The description fits very closely, except for a slight difference in spore width, the fungus found in Missouri. P. sojaecola Massal. was reported by Olive and Walker[3] as causing a severe leaf spot of soybean in Maryland and New Jersey. The symptoms of the disease described by these workers were similar to those observed on diseased plants in Missouri. However, the fungus described by them produced conidia which averaged 3.2 x 8 μ and generally contained two conspicuous oil droplets. The description of P. sojaecola in Saccardo[4] from the original work by Massalongo in 1900 reported the spores as oblong, hyaline, 2-3 guttulate, and 3-3.5 x 5-10 μ. The spores of P. sojaecola would thus appear to be larger and more distinctly guttulate than those of the Missouri fungus. For these reasons, the latter has been designated as Phyllosticta glycineum.

DEPARTMENT OF BOTANY, UNIVERSITY OF MISSOURI, COLUMBIA

EFFECT OF SOIL APPLICATIONS OF VARIOUS CHLORINATED HYDROCARBONS ON THE TOP GROWTH OF BLAKEMORE STRAWBERRY PLANTS

M. C. Goldsworthy

Goldsworthy[1] and Goldsworthy and Dunegan[2] have shown that the chlorinated hydrocarbon designated as technical DDT, when incorporated with soil, suppresses the root and top growth of Blakemore strawberry plants.

In these tests, in addition to technical DDT, the chlorinated hydrocarbons benzene hexachloride, chlorinated camphene (Toxaphene), Chlordane (10-6-8), and pure para para dichloro diphenyl trichloroethane were used and compared.

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3 Olive, L. S., and E. A. Walker. A severe leafspot of soybean caused by Phyllosticta sojaecola. Plant Disease Reporter 28: 1122-1123. 1944.

4 Saccardo. Sylloge Fungorum XVI: 833.

1 Goldsworthy, M. C. The effect of aging, in various soils, on the toxicity of technical DDT to successive crops of Blakemore strawberry plants. 1948. (To be published).

2 _____ and J. C. Dunegan. The effect of incorporating technical DDT in soil on the growth of Blakemore strawberry plants. Plant Disease Reporter 32: 135-137. Apr. 15, 1948.

All of the chlorinated chemicals were used at the rates of 0, 12, 25, 50, 100, 200, 300, and 400 pounds per acre (based upon a 6 2/3-inch profile or 2,000,000 pounds of soil). Since Toxaphene and Chlordane are gummy products, all of the chemicals were dissolved in acetone before mixing with the soil. The soil used in these tests may be described as a Sassafras sandy loam, a common agricultural soil of the middle Atlantic States having a fairly good native fertility and possessing about 12 percent of colloidal matter. This soil was slightly acid.

The chemicals were mixed with the Sassafras sandy loam by atomizing the acetone solution onto the soil particles while mixing. In this manner a fairly good mixture was obtained. Since the acetone solution was readily volatile, a slight loss of the dissolved chemical resulted when the solution was atomized into the soil mass.

Table 1. Effect of adding various chlorinated hydrocarbons to Sassafras sandy loam soil on the green weight of tops of Blakemore strawberry plants.*

Concentration	Chemical				
	Technical DDT	Para para DDT	Toxaphene	Chlordane (10-6-8)	Benzene hexachloride
lb./acre	grams	grams	grams	grams	grams
0	21.0	21.0	21.0	26.0	31.75
12	21.5	25.0	23.0	22.0	39.6
25	23.5	25.0	29.0	28.0	38.1
50	20.5	25.0	30.0	26.0	35.9
100	12.5	21.0	27.0	28.0	38.5
200	11.4	20.0	26.0	32.0	40.75
300	9.3	16.0	29.0	28.0	41.87
400	9.4	13.0	30.0	27.0	31.75
Least signif. diff. at 5%	4.36	5.40	4.90	5.20	6.90
Least signif. diff. at 1%	5.79	7.20	6.52	6.90	9.7

* Averages are for 8 replicates for each treatment.

Eighty pounds of soil was treated for each concentration, and the amounts of each chemical used per lot were 0, 217, 450, 900, 1,800, 3,600, 5,400, and 7,200 milligrams, respectively, for the 0-, 12-, 25-, 50-, 100-, 200-, 300-, and 400-pound-per-acre concentrations. The 80 pounds of treated soil was distributed in eight 8-inch pots and each pot was planted to three 1-year-old Blakemore strawberry plants. Each set of 64 pots was randomized and all of the pots were embedded in rows in a field plot where the plants were allowed to grow throughout a single season. Weeding was practiced diligently throughout the season

and, since insect injury was almost lacking and growing conditions were excellent, a very fine crop of plants was produced.

Results

Table 1 shows the various chemicals and concentrations used, and the means of the various replicates at each concentration. It will be observed that the technical DDT used in this experiment caused the greatest suppression of growth and that the para para isomer of DDT was considerably less injurious than the technical DDT. None of the other chemicals appeared to have any deleterious effects upon the growth of Blakemore strawberry plants. Some of them appeared to accelerate growth, and especially was this true of benzene hexachloride.

The results with the technical DDT corroborate in general those obtained in previous experiments. The results with the para para dichloro diphenyl trichloroethane appear to indicate that some other constituent of technical DDT may be responsible for part of the suppression of growth observed so constantly when this material is added to soils in which Blakemore strawberry plants are grown. What constituent of technical DDT is responsible for the suppression we are not at this time in a position to know.

DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE

X-DISEASE ON SOUR CHERRY IN NEW YORK

K. G. Parker and D. H. Palmiter

During the past two years a disease of sour cherry has been identified as caused by the peach and chokecherry X-disease virus and was reported to the Phytopathological Society in December 1947[1]. This additional report is presented in order to make available a more detailed description of the symptoms than could be given in the abstract cited.

Bud and graft inoculations to young cherry trees resulted in a pronounced wilt and frequently in the death of the trees during the first growing season after inoculation. Similar inoculations with buds

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[1] Palmiter, D. H. and Parker, K. G. Peach X-disease on sour cherry. (Abs.) Phytopath. 38: 20. 1948

and scions from chokecherry affected by the X-disease caused identical symptoms. Inoculations to peach from both Montmorency and English Morello cherry resulted in typical X-disease symptoms. Inoculations with scions from rosetted mazzard sprouts from the roots of an affected Montmorency tree caused wilt symptoms on cherry.

The known symptoms are several, but not often has a single tree been observed to exhibit all types of symptoms described. The blossoms tend to open a few days later than normal. On severely affected trees or branches, particularly of English Morello, all fruit may drop within a few days after petal fall. A part or all of the fruit that persists fails to mature. The affected fruit is small, pink to nearly white in color, often pointed in shape, and insipid to slightly bitter. It is completely worthless.

Terminal growth is likely to continue longer into the summer, but with the total length of the terminals shorter than normal, and with the internodes towards the ends of the shoots shortened. The entire tree often has a lighter green aspect than normal. Sucker growths have been observed with a distinctly rosetted type of growth.

On the Montmorency variety, late in the season a yellow to reddish discoloration may appear along the midveins of a few leaves, particularly toward the base of the leaf. The pattern of this discoloration is distinctly different from that associated with the virus yellows disease.

Symptoms may be exhibited on the entire tree; or they may be limited to certain parts, sometimes to a single small branch. Affected branches may be interspersed among apparently healthy ones. On a given branch or tree a part of the fruit may drop early, other fruit may persist but fail to mature, and still other fruit may mature apparently normally.

Wilt and subsequent death of trees of the Montmorency variety has been observed in bearing orchards in which the typical immature fruit symptoms occur. The development of the wilt symptoms on these trees seemed to parallel that which occurred on artificially inoculated young trees. Inoculation trials were made in 1947 to determine whether the wilt observed on bearing trees in the orchard is a part of the X-disease symptom complex under those conditions. The results of these tests will not be available until the growing season of 1948.

Nothing like a complete survey has been made but the X-disease of sour cherries has been observed in at least 16 orchards and roadside sites in four counties. Its severity was rated as moderately severe or severe in seven orchards studied in some detail. In 1947, in the more severely affected part of one orchard 110 of 160 English Morello trees examined bore no fruit at all and 15 others bore a high proportion of immature fruit. In the same part of this orchard, 11 of 87

interplanted Montmorency trees bore no good fruit and 38 others bore partly poor fruit.

At all sites where a careful study was made, chokecherry showing X-disease symptoms was observed within a few hundred feet of the affected cherry trees. There usually was a concentration of the trouble at the margins of the orchards nearest the chokecherries. At 5 locations, peach trees also were observed and they exhibited typical X-disease symptoms.

CORNELL UNIVERSITY AND NEW YORK STATE AGRICULTURAL EXPERIMENT STATIONS

EARLY DEVELOPMENT OF APPLE SCAB

APPLE SCAB ASCOSPORE DEVELOPMENT ABNORMALLY EARLY IN MASSACHUSETTS: Within five or six days after the snow had disappeared from the orchard floor, at least some of the overwintered leaves in Amherst orchards contained a small number of mature ascospores of the apple scab fungus, Venturia inaequalis. Other scabbed leaves were normal for perithecial development, showing very immature perithecia with either no asci yet or perhaps a few young asci that contained no spores.

By March 27 to 29, about 10 to 12 days after the snow had gone, perithecial development was sufficiently advanced in some leaves from two orchards in Amherst, and in leaf samples received from Brimfield, Sterling, West Bridgewater, West Newbury, and Templeton, to give a light ascospore discharge after the leaves had been wet for 3 to 4 hours in the laboratory. The fruit buds at that time were strictly dormant.

As in 1947, there was evidence again this spring that in a good many orchards in at least a few leaves perithecia reached nearly full growth with a small percent of ripe ascospores before the onset of the winter dormant season. Most of those early spores were dead when the leaves were examined in March, but the immature asci survived the winter and developed rapidly during the warmer days from March 18 onward.

Indications are that early-fall dropping of scabbed leaves, together with the lower, damper orchard sites, is the chief factor contributing to early perithecial development. Considering how dry it was last year during the later summer and fall months, it was rather surprising to find advanced perithecial development so general this spring. -- O. C. Boyd, Massachusetts State College, Amherst. April 5.

EARLY MATURITY OF APPLE SCAB SPORES IN WISCONSIN: Mature spores of Venturia inaequalis were found today. This is somewhat earlier than usual. -- R. E. Vaughan, University of Wisconsin, Madison. April 1.

EXTENSION OF THE RANGE OF THE LITTLE-LEAF DISEASE OF SHORTLEAF PINE IN GEORGIA

A. E. Patterson and L. W. R. Jackson[1]

The little-leaf disease of pine was first reported in 1934 and 1935 on shortleaf pine (Pinus echinata Mill.) in Alabama. Later investigation showed that the disease occurs extensively on shortleaf pine, and to a lesser extent on loblolly pine (P. taeda L.), Virginia pine (P. virginiana Mill.), and pitch pine (P. rigida Mill.).[2]

A 1945 report[3] on the distribution of little leaf in the Georgia Piedmont, showed that its occurrence was confined to limited zones in the east-central and west-central part of the State. Since little leaf had not been reported from most of the counties in the central part of the Georgia Piedmont, the staff of the Georgia Forest Appraisal project decided to check the distribution by reporting the occurrence of little leaf on the approximately 16,000 plots that were sampled in the Piedmont region of Georgia.

At the time of the Georgia Forest Resource Appraisal, the known distribution of the little-leaf disease of shortleaf pine in Georgia[3] covered 23 counties in the Piedmont and 2 counties adjoining the northern edge of the Piedmont. The Appraisal data reported the prevalence of little leaf on the survey plots in 42 counties in the Piedmont, and in 2 additional counties adjoining the Piedmont. The Appraisal data included 17 counties that had been reported previously[3]. As a result of the Appraisal survey, the range of little leaf has been extended to include an additional 27 counties within and bordering on the Piedmont. The revised distribution of little leaf (Fig. 1) covers 48 of the 49 counties partly or wholly in the Piedmont, and 4 counties bordering on the Piedmont of Georgia.

The economic importance of the little-leaf disease becomes apparent when it is realized that the affected counties of the Georgia Piedmont have 7,050,234 acres of forest land on which there are 7,328,190,000 board feet of pine sawtimber. The affected counties bordering on the Georgia Piedmont have 681,138 acres of forest land and 648,190,000 board feet of pine sawtimber[4].

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[1] Associate Professor of Forest Management, and Professor of Silviculture, respectively; George Foster Peabody School of Forestry, University of Georgia.

[2] Jackson, L.W.R. Root defects of fungi associated with the little-leaf disease of southern pines. Phytopath. 35(2):91-105. 1945.

[3] Hepting, G. H., T.S. Buchanan, and L.W.R. Jackson. Little leaf disease of pine. U.S. Dept. Agr. Circular No. 716. 1945.

[4] Grant, B. F., and A. E. Patterson. Forest facts for Georgia. Agricultural and Industrial Development Board of Georgia. Forestry Bul. No. 10. 1946.

Furthermore, these counties have 423 industries, such as sawmills, pulpmills, veneer mills, which use the products of the forest[5]. These industries employ more than 18,300 persons[5].

On the basis of these new data, it is apparent that the little-leaf disease is either spreading, or is much more widespread than was shown by previous surveys.

GEORGE FOSTER PEABODY SCHOOL OF FORESTRY, UNIVERSITY OF GEORGIA, ATHENS

DETERIORATION OF SHORTLEAF PINE ROOTS CAUSED BY A PARASITIC NEMATODE

L. W. R. Jackson

A parasitic nematode identified as Criconemoides rusticum (Micoletzky) Taylor[1] has been found associated with the deterioration of the fine roots, including mycorrhizae, of one-year-old potted shortleaf pine (Pinus echinata Mill.) seedlings. The soils used in the series of pot cultures came from three-year-old field stands of pine with heavy prevalence of the little-leaf disease. The nematodes were also found on the fine roots of unthrifty shortleaf pine collected from two stands in the vicinity of Athens, Georgia.

The nematodes penetrate the cortex of the fine roots and mycorrhizae with their anterior part, and the posterior part protrudes from the surface of the root. The parasitized portion of the fine roots becomes necrotic and reddish-brown in color. The mycorrhizae become excessively swollen and spongy, and the surface is covered with finely reticulated brown scales. An examination of stained sections showed that the swollen scaly mycorrhizae did not have the mantle and Hartig net which are the characteristics of normal ectotrophic mycorrhizae.

The Criconemoides are recognized as widely distributed parasites of the roots of trees and plants. Taylor[1] stated that C. rusticum had been found on tree roots in Austria and Switzerland and in soil material in Germany, Roumania, Washington, D. C., and Ellabelle, Georgia. The results of this study indicate that the foliar decline of pines in the southern pine region may be caused primarily by root-invading nematodes.

GEORGE FOSTER PEABODY SCHOOL OF FORESTRY, ATHENS, GEORGIA

5 Report of "Manufacturers of Georgia", by the Agricultural and Industrial Development Board of Georgia, Atlanta, Georgia. 1947.

1 Taylor, A. L. The genera and species of the Criconematinae, a subfamily of the Anguillulinidae (Nematoda). Trans. Amer. Micros. Soc. 55(4): 391-421. 1936.

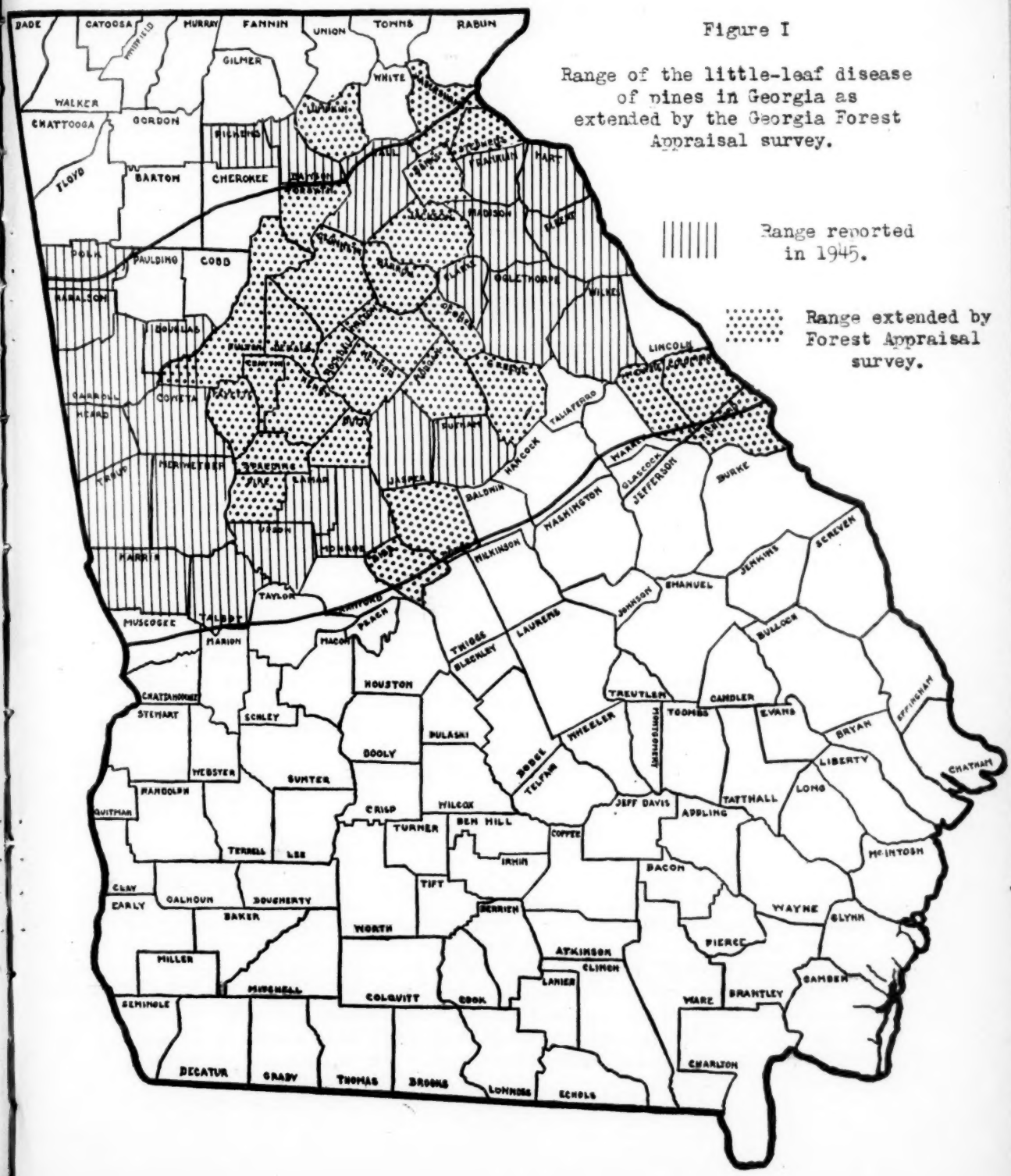

Figure I

Range of the little-leaf disease of pines in Georgia as extended by the Georgia Forest Appraisal survey.

Range reported in 1945.

Range extended by Forest Appraisal survey.

BRIEF NOTES ON PLANT DISEASES

A LEAF SPOT OF SEEDLING CABBAGE ASSOCIATED WITH UNBALANCE OF NITROGEN AND PHOSPHORUS

By W. D. Valleau and Stephen Diachun

What appeared to be phosphorus-nitrogen disturbance occured in cabbage seedlings growing in a hotbed on the farm of a market gardner near Lexington, Kentucky, in the middle of March, 1948. The plants were about eight inches tall. The older leaves were peppered with minute dark necrotic spots, some of which had coalesced to form spots up to one-fourth inch in diameter. The younger leaves had small necrotic dots surrounded by a yellow halo and the youngest leaves showed scattered chlorotic dots. The general condition in the bed was one of lack of vigor. The spotting was somewhat similar to phosphorus starvation as it occurs in tobacco plants a few weeks after setting in a low-phosphorus soil. Following our suggestion that it might be phosphorus starvation, Dr. E. M. Emmert, who collected the plants and brought them to us, ran phosphorus and nitrogen tissue tests and found the phosphorus content only about half that of normal-appearing plants growing at the station, while the nitrate content was several times higher. The bed had been nitrated twice. A test indicated that available potash in the soil was very high. A test for acid-soluble phosphorus indicated 1350 pounds of supposedly available phosphorus per acre, which is very high. The excessive intake of nitrates had possibly reduced the intake of phosphorus to a point where it showed low in tissue tests. There is also the possibility of an excessive intake of potassium nitrate, which we have observed causes leaf spotting in tobacco plants when used as the only source of nitrate for potted plants.

UNIVERSITY OF KENTUCKY

POD AND STEM BLIGHT ON SOYBEANS IN OHIO, 1947

By T. H. King

Pod and stem blight (*Diaporthe* [*phaseolorum* var.] *sojae*) was observed in two counties in Ohio in 1947. The disease was first found affecting the Mandel variety of soybeans in a field in Defiance County on August 30. It started in a small patch about 3 feet in diameter and within 2 weeks all plants within a diameter of 25 feet of the original infection points were dead. On September 12, the disease was found in a 21-acre field of Manchu soybeans in Delaware County. All of the plants in an area of 30 feet in diameter were dead and the fungus was found fruiting profusely on these plants and was spreading rapidly to the adjacent plants.

OHIO STATE UNIVERSITY

AN OUTBREAK OF AZALEA FLOWER BLIGHT IN FLORIDA

G. F. Weber

During the third week of March, flower blight caused by Ovulinia azaleae Weiss, made its appearance on azaleas in Gainesville, Florida, following a record breaking eight inches of rain during the first ten days of the month. The disease had been found only in isolated plantings during the past three years in this city and then only in very light infections that were not destructive enough to require control methods, and usually escaped the attention of everyone. The present outbreak is an expected response of this fungus under almost ideal conditions of humidity and temperature. Many torn corollas from rain injury possibly aided in primary infection. The spread of the disease has been rapid. Primary infection on apparently healthy plants was mostly located on the topmost flowers and indicated insect transmission rather than the wind, or air agency, since a larger percent of these infections were in the narrow throat of the flowers rather than on the many times more expansive areas of the flaring corollas. Secondary infection appeared within 48 hours on the nearby flowers but was more plentiful among the lower and more protected flowers than the earlier infection. There was no visible difference in resistance or susceptibility detected.

UNIVERSITY OF FLORIDA

A RÉSUMÉ OF THE FUNGUS COLLECTIONS OF GEORGE W. CARVER

Paul L. Lentz and John A. Stevenson

One of the little publicized hobbies of the late George W. Carver of Tuskegee Institute was the collecting of fungus specimens with particular reference to those fungi known to be plant parasites. This interest had been aroused during his student days at Iowa State College where he came under the influence of L. H. Pammel, one of the pioneer Iowa botanists. Among their joint efforts at that time, mycologically speaking, was an annotated list (5) of fungi collected and studied at Ames in 1895.

Dr. Carver continued to collect fungi after taking up what was to be his life's work at Tuskegee and was in correspondence for many years with J. B. Ellis and L. H. Pammel. Of his mycological activities for this period there is but one record, a briefly annotated list of the species of Cercospora collected by him in and about Tuskegee, and published in two editions (1). Seventy species are recorded in the first edition, 74 in the second. The species given in this list are not repeated here unless later collections have come to our attention. Doubtless many of his other collections in other groups will be found in the Ellis Herbarium and in the fungus herbarium of the Botany Department at Ames.

In later years he began sending his fungus collections to Dr. C. L. Shear, who, with the assistance of colleagues, made many determinations of Tuskegee material. Dr. Carver was particularly encouraged to search for certain Pyrenomycetes in which Shear was taxonomically interested at the time. In so far as possible specimens which came to our collections in this way have been included in the present summary.

Brief records of some of these specimens have been given in the Plant Disease Reporter by Shear (6) and Miller (4).

In July 1935 Dr. Carver was appointed a collaborator of the Plant Disease Survey, a circumstance which renewed his interest in fungi and resulted in a new series of over 800 collections. These specimens, in so far as found determinable, form the basis of the present list with the addition as already indicated of other Carver records available here. Several of the specimens which proved to be of particular interest because of pathological significance or as new occurrence records were noted briefly in the Plant Disease Reporter (2, 3, 7).

Acknowledgement is made of direct assistance received, through the identification of many of the specimens involved, from C. L. Shear, Wm. W. Diehl, Edith K. Cash, and Edna Dicks.

MYXOMYCETES

BADHAMIA PAPAVERACEA Berk. & Rav.:
Salix nigra

PHYCOMYCETES

ALBUGO CANDIDA [Pers.] Kuntze:
Brassica sp.
ALBUGO PLATENSIS (Speg.) Swing.:
Boerhaavia sp.

PERONOSPORA ARTHURI Farl.:
Oenothera speciosa
PERONOSPORA LAMII A. Braun:
Lamium amplexicaule

PLASMOPARA HALSTEDII (Farl.) Berl. & DeT.:
Gnaphalium purpureum
PLASMOPARA VITICOLA (Berk. & Curt.) Berl. & DeT.:
Vitis rotundifolia

ASCOMYCETES

AMPHISPHAERIA INCRUSTANS Ell. & Ev.
Nyssa sylvatica
AMPHISPHAERIA sp.:
Citrus sp.

ANTHOSTOMELLA NIGRO-ANNULATA (Berk. & Curt.) Sacc.:
Yucca aloifolia

BOTRYOSPHAERIA RIBIS Gross. & Dugg.:
Catalpa bignonioides, Cercis canadensis, Datura stramonium, Erythrina herbacea, Firmiana simplex, Forsythia suspensa, Fraxinus nigra, Gymnocladus dioica, Ligustrum sp., Melia azedarach, Nerium oleander, Platanus occidentalis, Populus deltoides, Populus grandidentata, Robinia pseudoacacia, Rubus frondosus, Rubus procerus, Rumex crispus, Sambucus canadensis, Stizolobium deeringianum, Viburnum lantana, Vicia villosa, Vitex agnus-castus.
BOTRYOSPHAERIA sp.:
Melia azedarach, Vaccinium arboreum

CALONECTRIA OCHRACEO-PALLIDA (Berk. & Br.) Sacc.:
Jasminum mesnyi

CALONECTRIA POLYTHALAMA (Berk.) Sacc.:
Fraxinus americana, Fraxinus nigra, Jasminum mesnyi, Ligustrum japonicum, Ligustrum lucidum, Ligustrum sp.

CALOSPORA sp.:
Stizolobium deeringianum

CARYOSPORA CALLICARPA (Curr.) Nits. ap. Fckl.:
Quercus sp.

CENANGELLA RAVENELII (Berk.) Sacc.:
Ilex decidua

CENANGIUM FERRUGINOSUM Fr.:
Pinus taeda

CHAETOSPHAERIA PANNICOLA (Berk. & Curt.) Sacc.:
Salix nigra

CLAVICEPS PASPALI F.L. Stevens & J. G. Hall:
Paspalum dilatatum

CRYPTODIAPORTHE MYINDA (Cke. & Ell.) Wehm.:
Acer saccharinum
CRYPTODIAPORTHE PAULULA (Cke. & Ell.) Wehm.:
Nyssa sylvatica

CRYPTOSPORA ACUTEANS (Schw.) Ell. & Ev.:
Rhus glabra

DIALONECTRIA DESMAZIERII (DeN.) Petch:
Buxus sempervirens
DIALONECTRIA SANGUINEA (Sibth. ex Fr.) Cke.:
Diatrypella verrucaeformis, Eutypa ludibunda, Eutypella scoparia, Eutypella stellulata, Nummularia sp.

DIAPORTHE ERES Nits.:
Erythrina herbacea, Hibiscus syriacus
DIAPORTHE SOCIATA (Cke. & Ell.) Sacc.:
Cassia occidentalis

APIODIAPORTHE PHOMASPORA (Cke. & Ell.) Wehm.:
Alnus rugosa

DIAPORTHOPSIS sp.:
Gnaphalium purpureum

DIATRYPE ASTEROSTOMA Berk. & Curt.:
Nyssa sylvatica

DIATRYPE STIGMA (Hoffm. ex Fr.) Fr.:
Acer rubrum, Carya alba, Ilex decidua, Ilex vomitoria, Ligustrum sp., Ostrya virginiana, Pyrus communis, Quercus nigra
DIATRYPE sp.:
Cercis canadensis, Fraxinus nigra.

DIATRYPELLA HERBACEA Ell. & Ev.:
Firmiana simplex
DIATRYPELLA POPULI Ell. & Holw.:
Populus deltoides
DIATRYPELLA VERRUCAEFORMIS (Ehr. ex Fr.) Nits.:
Hibiscus syriacus, Ligustrum japonicum, Ligustrum sp., Stizolobium deeringianum
DIATRYPELLA sp.:
Smilax pseudochina

DIBOTRYON MORBOSUM (Schw.) Th. & Syd.:
Prunus cerasus

ENDOTHIA GYROSA (Schw.) Fr.:
Liquidambar styraciflua

ERYSIPHE CICHORACEARUM DC.:
Xanthium canadense, Zinnia elegans

EUTYPA HETERACANTHA Sacc.:
Arundo donax, Berberis aquifolium, Sambucus canadensis
EUTYPA LUDIBUNDA Sacc.:
Forsythia suspensa, Ilex vomitoria, Ligustrum sp., Ricinus communis

EUTYPELLA FRAXINICOLA (Cke. & Pk.) Sacc.:
Fraxinus nigra
EUTYPELLA SCOPARIA (Schw.) Ell. & Ev.:
Juglans nigra
EUTYPELLA STELLULATA (Fr.) Sacc.:
Fraxinus nigra, Magnolia virginiana, Rosa multiflora, Vitis rotundifolia, Wisteria sinensis.

FRACCHIAEA HETEROGENEA Sacc.:
Gleditsia triacanthos, Magnolia virginiana, Nyssa sylvatica, Sambucus canadensis, Ulmus alata.

GLOMERELLA CINGULATA (Ston.) Spauld. & Schrenk:
Persea gratissima

GLONIOPSIS PRAELONGUM (Schw.) Undw. & Earle:
Acacia angustissima, Catalpa bignonioides, Ligustrum japonicum

GLONIUM PARVULUM (Gerard) Sacc.:
Liriodendron tulipifera, Pinus palustris, Pinus taeda
GLONIUM sp.:
Vitis rotundifolia

GNOMONIA ULMEA (Schw.) Thuem.:
Ulmus racemosa

GUIGNARDIA BIDWELLII (Ell.) Viala & Ravaz:
Parthenocissus tricuspidata

HERPOTRICHIA DIFFUSA (Schw.) Ell. & Ev.:
Broussonetia papyrifera

HYPOCREA MINIMA Sacc. & Ell.:
Magnolia virginiana
HYPROCREA spp.:
Nerium oleander

HYPOXYLON FUSCO-PURPUREUM (Schw.) Berk.:
Acer rubrum, Citrus trifoliata, Prunus serotina
HYPOXYLON FUSCUM (Pers. ex Fr.) Fr.:
Betula nigra
? HYPOXYLON HOWEIANUM Pk.:
Magnolia virginiana
HYPOXYLON MULTIFORME Fr.:
Berchemia scandens, Broussonetia papyrifera.
HYPOXYLON MARGINATUM (Schw.) Berk.:
Ostrya virginiana, Quercus nigra.
HYPOXYLON PERFORATUM (Schw.) Fr.:
Aralia spinosa, Broussonetia papyrifera, Forsythia suspensa, Ilex vomitoria, Lantana camara, Ligustrum sp., Liquidambar styraciflua, Maclura pomifera, Malus coronaria, Nyssa sylvatica, Parthenocissus quinquefolia, Pyrus communis, Rhus vernix, Quercus nigra, Sassafras sp., Styrax japonica, Ulmus americana, Ulmus racemosa, Vaccinium arboreum, Vitis rotundifolia.
HYPOXYLON PLATYSTOMUM Ell. & Ev.:
Melia azedarach
HYPOXYLON RUBIGINOSUM (Pers. ex Fr.) Fr.:
Berchemia scandens, Carya pecan, Fraxinus nigra, Magnolia virginiana, Nyssa sylvatica, Populus deltoides, Prunus persica, Quercus nigra, Salix nigra.
HYPOXYLON sp.:
Acacia angustissima

HYSTERIUM ANGUSTATUM (Alb. & Schw. ex Fr.) Chev.:
Vaccinium arboreum
HYSTERIUM sp.:
X Spiraea vanhouttei

HYSTEROGRAPHIUM LESQUEREUXII (Duby) Sacc.:
Gleditsia triacanthos, Lagerstroemia indica, Rosa sp.
HYSTEROGRAPHIUM MORI (Schw.) Rehm:
Prunus persica
HYSTEROGRAPHIUM VULVATUM (Schw.) Sacc.:
Pyrus communis, Quercus nigra.

LEPTOSPHAERIA ARUNDINACEA (Sow. ex Fr.) Sacc.:
Zea mays
LEPTOSPHAERIA CONIOTHYRIUM (Fckl.) Sacc.:
Sambucus canadensis
LEPTOSPHAERIA OBTUSISPORA Speg.:
Yucca gloriosa
LEPTOSPHAERIA sp.:
Hibiscus moscheutos

LOPHODERMIUM PINASTRI (Schrad. ex Fr.) Chev.:
Pinus taeda

MELANCONIS sp.:
Rhus glabra, Vaccinium arboreum

MELOMASTIA sp.:
Ligustrum sp.

METASPHAERIA sp.:
Amphiachyris dracunculoides

MICROSPHAERA ALNI (DC.) Wint.:
Apios tuberosa, Gleditsia triacanthos, Platanus occidentalis, Quercus velutina.
MICROSPHAERA DIFFUSA Cke. & Pk.:
Desmodium longifolium, Sambucus canadensis.

MYCOSPHAERELLA OPUNTIAE (Ell. & Ev.) Deorn.:
Opuntia engelmannii, Opuntia polyacantha.

NECTRIA CHLORELLA (Fr.) Tul.:
Cedrus deodara
NECTRIA CINNABARINA (Tode ex Fr.) Fr.:
Buxus sempervirens, Callicarpa americana, Celtis pumila, Ficus carica, Melia azedarach, Morus alba, Prunus persica, Stizolobium deeringianum, Wisteria sinensis.
NECTRIA COCCINEA (Pers. ex Fr.) Fr.:
Melia azedarach
NECTRIA IPOMOEAE Halst.:
Solanum sp.
NECTRIA VERRUCOSA (Schw.) Sacc.:
Epiphyllum latifrons

NECTRIA sp.:
Ricinus communis, Zea mays.

NEOCOSMOSPORA VASINFECTA E.F.Sm.:
Arachis hypogaea

NEUROSPORA TETRASPERMA Shear & B. O. Dodge:
Populus deltoides

NITSCHKIA sp.:
Broussonetia papyrifera

NUMMULARIA ATROPUNCTATA (Schw.) Hoehn.:
Quercus marilandica, Quercus nigra.
NUMMULARIA CLYPEUS (Schw.) Cke.:
Acacia angustissima, Celtis mississippiensis, Ulmus alata.
NUMMULARIA HYPOPHLAEA (Berk. & Rav.) Cke.:
Liriodendron tulipifera, Vitis rotundifolia
NUMMULARIA MICROPLACA (Berk. & Curt.) Cke.:
Sassafras albidum
NUMMULARIA TINCTOR (Berk.) Ell. & Ev.:
Acer rubrum, Alnus rugosa, Betula nigra, Broussonetia papyrifera, Cytisus scoparius, Ilex opaca, Ligustrum sp., Morus alba.

OPHIOBOLUS CONSIMILIS Ell. & Ev.:
Lycopersicum esculentum
OPHIOBOLUS sp.:
Lactuca canadensis

OPHIODOTHELLA VACCINII Boyd:
Vaccinium arboreum

ORBILIA DECIPIENS (Phill.) Sacc.:
Old Cord.
ORBILIA sp.:
Gleditsia triacanthos

PERONEUTYPA HETERACANTHA (Sacc.) Berl.:
Berberis aquifolium

PHYLLACHORA AMBROSIAE (Berk. & Curt.) Sacc.:
Ambrosia artemisiifolia
PHYLLACHORA ARUNDINARIAE Orton:
Arundinaria tecta
PHYLLACHORA GRAMINIS (Pers. ex Schw.) Fckl.:
Erianthus saccharoides

PHYLLACTINIA CORYLEA (Pers.) Karst.:
Quercus nigra, Ulmus alata, Ulmus americana, Ulmus racemosa.

PHYSALOSPORA OBTUSA (Schw.) Cke.:
Acer saccharinum, Aesculus pavia, Alnus rugosa, Betula nigra, Bignonia capreolata, Canna indica, Catalpa bignonioides, Cotoneaster pyracantha, Cytisus scoparius, Fraxinus americana, Hibiscus syriacus, Ilex vomitoria, Lagerstroemia indica, Lantana camara, Lespedeza bicolor, Ligustrum sp., Liquidambar styraciflua, Malus coronaria, Malus floribunda, Parthenocissus quinquefolia, Populus grandidentata, Prunus angustifolia, Rhus copallina, Rhus vernix, Sassafras albidum, Staphylea trifolia, Ulmus alata, Vaccinium arboreum, Vitis rotundifolia.

PHYSALOSPORA POLYGONI Ell. & Ev.:
Polygonum pennsylvanicum

PHYSALOSPORA RHODINA Berk. & Curt.:
Diospyros virginiana, Saccharum officinarum

PHYSALOSPORA sp.:
Cytisus scoparius, Euphorbia preslii, Jasminum mesnyi, Melilotus alba, Prenanthes altissima.

PLEOSPORA SAMBUCI (Plowr.) Sacc.:
Sambucus canadensis

ROSELLINIA AQUILA (Fr.) DeN.:
Forsythia suspensa, Lagerstroemia indica, Liriodendron tulipifera, Lonicera flava, Morus alba, Nyssa sylvatica, Pyrus communis, Rhus toxicodendron, Salix nigra, Ulmus alata, Vitis rotundifolia.

ROSELLINIA AMBIGUA Sacc.:
Quercus nigra, Quercus rubra

ROSELLINIA CORTICIUM (Schw.) Sacc.:
Forsythia suspensa

ROSELLINIA DESMAZIERII (Berk. & Br.) Sacc.:
Morus alba

ROSELLINIA PULVERACEA (Ehr. ex Fr.) Fckl.:
Gleditsia triacanthos, Ligustrum sp., Platanus occidentalis.

SCHIZOXYLON INSIGNE (DeN.) Rehm:
Morus rubra

SPHAEROTHECA HUMULI (DC.) Burr.:
Prenanthes altissima

STICTIS HELICOTRICHA Ell. & Ev.:
Arundo donax

STICTIS MOLLIS Pers.:
Maclura pomifera

STICTIS RADIATA [L.] Pers.:
Ambrosia artemisiifolia, Eupatorium capillifolium, Gleditsia triacanthos, Ludvigia alternifolia, Magnolia virginiana, Phytolacca decandra, Polygonum pennsylvanicum, Rumex crispus, Stizolobium deeringianum, Zea mays.

STICTIS sp.:
Prenanthes altissima

THAXTERIELLA LIGNICOLA Teng.:
Berchemia scandens, Quercus nigra.

THYRIDARIA EUTYPOIDES Ell. & Ev.
Broussonetia papyrifera

TRYBLIDIELLA HYSTERINA (J. Duf.) Shear:
Ilex vomitoria
TRYBLIDIELLA RUFULA (Spreng. ex Fr.) Sacc.:
Acer saccharinum, Citrus trifoliata, Cytisus scoparius, Gleditsia triacanthos, Hibiscus syriacus, Lagerstroemia indica, Maclura pomifera, Magnolia virginiana, Morus alba, Morus rubra, Ptelea trifoliata, Robinia hispida, Stizolobium deeringianum, Styrax japonica.

UNCINULA NECATOR (Schw.) Burr.:
Acer rubrum, Parthenocissus quinquefolia.
UNCINULA PARVULA Cke. & Pk.:
Celtis pumila

VALSA CERATOPHORA Tul.:
Diospyros virginiana, Liquidambar styraciflua
VALSA CORONATA (Hoffm. ex Fr.) Fr.:
Crataegus flava
VALSA LEUCOSTOMA (Pers. ex Fr.) Fr.:
Prunus serotina
VALSA LUTESCENS Ell.:
Quercus nigra
VALSA SALICINA (Pers. ex Fr.) Fr.:
Salix nigra

VALSARIA EXASPERANS (Gerard) Sacc.:
Ailanthus glandulosa, Ligustrum sp., Liriodendron tulipifera, Magnolia virginiana, Melia azedarach, Nerium oleander, Populus deltoides, Prunus persica, Quercus laevis, Quercus phellos, Rhus glabra, Vitis rotundifolia.
VALSARIA INSITIVA Ces. & DeN.:
Betula nigra, Carya pecan, Celtis pumila, Hibiscus syriacus, Lagerstroemia indica, Magnolia virginiana, Melia azedarach, Quercus nigra, Robinia hispida, Robinia pseudoacacia, Wisteria sinensis.
VALSARIA sp.:
Acacia angustissima, Betula nigra, Staphylea trifolia.

VALSELLA LASCHII (Nits.) Sacc.:
Acer rubrum

VALSELLA sp.:
Aesculus octandra, Robinia pseudoacacia, Vaccinium arboreum

XYLARIA HYPOXYLON [L.] Grev.:
Quercus nigra
XYLARIA MULTIPLEX (G. Kunze & Fr.) Berk. & Curt.:
Lagerstroemia indica
XYLARIA sp.:
Diospyros virginiana

BASIDIOMYCETES

APLOPSORA NYSSAE (Ell. & Tracy) Mains:
Nyssa sylvatica

COLEOSPORIUM IPOMOEAE (Schw.) Burr.:
Ipomoea purpurea
COLEOSPORIUM SOLIDAGINIS (Schw.) Thuem.:
Solidago serotina
COLEOSPORIUM TEREBINTHINACEAE (Schw.) Arth.:
Silphium sp.

FROMMEA OBTUSA (Strauss) Arth.:
Duchesnea indica
FROMMEA OBTUSA (Strauss) Arth. var. DUCHESNEAE Arth.:
Duchesnea indica

GUEPINIA SPATHULARIA (Schw.) Fr.:
Undetermined Wood.

GYMNOSPORANGIUM JUNIPERI-VIRGINIANAE Schw.:
Malus coronaria, Malus pumila, Malus scheideckeri.

IRPEX CINNAMOMEUS Fr.:
Vitis rotundifolia

KUEHNEOLA MALVICOLA (Speg.) Arth.:
Hibiscus syriacus
KUEHNEOLA UREDINIS (Lk.) Arth.:
Rubus frondosus

MARASMIUS PYRINUS Ell.:
Ligustrum sp.

MELAMPSORA ABIETI-CAPRAEARUM Tub.:
Salix nigra
MELAMPSORA MEDUSAE Thuem.:
Populus deltoides

MELAMPSORELLA CERASTII (Pers.) Schroet.:
Stellaria media

PHYSOPELLA FICI (Cast.) Arth.:
Ficus carica

PHYSOPELLA VITIS (Thuem.) Arth.:
Vitis rotundifolia

PILEOLARIA TOXICODENDRI (Berk. & Rav.) Arth.:
Rhus toxicodendron

PUCCINIA ACETOSAE (Schum.) Koern.:
Rumex acetosella
PUCCINIA ANDROPOGONIS Schw.:
Andropogon scoparius
PUCCINIA ANTIRRHINI Diet. & Holw.:
Antirrhinum majus
PUCCINIA BOLLEYANA Sacc.:
Sambucus canadensis
PUCCINIA CORONATA Cda.:
Lolium perenne
PUCCINIA EXTENSICOLA Plowr.:
Solidago canadensis
PUCCINIA GNAPHALII (Speg.) P. Henn.:
Facelis apiculata, Gnaphalium purpureum
PUCCINIA GRAMINIS Pers. var. PHLEI-PRATENSIS (Eriks. & P. Henn.) Stakman & Piemeisel:
Phleum pratense
PUCCINIA HELIANTHI Schw.:
Helianthus angustifolius, Helianthus annuus, Helianthus grosseserratus
PUCCINIA HETEROSPORA Berk. & Curt.:
Sida spinosa
PUCCINIA HIERACII (Schm.) H. Mart.:
Gnaphalium purpureum
PUCCINIA PODOPHYLLI Schw.:
Podophyllum peltatum
PUCCINIA POLYGONI-AMPHIBII Pers.:
Polygonum pennsylvanicum
PUCCINIA PURPUREA Cke.:
Sorghum halepense
PUCCINIA RUELLIAE (Berk. & Br.) Lagh.:
Ruellia parviflora
PUCCINIA SILPHII Schw.:
Silphium sp.
PUCCINIA SORGHI Schw.:
Oxalis sp., Zea mays.

PUCCINIA SPEGAZZINII DeT.:
Mikania scandens
PUCCINIA XANTHII Schw.:
Xanthium canadense, Xanthium chinense
PUCCINIA sp.:
Undetermined Gramineae.

PUCCINIASTRUM MYRTILLI (Schum.) Arth.:
Rhododendron nudiflorum

RAVENELIA EPIPHYLLA (Schw.) Diet.:
Tephrosia virginiana

SPHACELOTHECA SORGHI (Lk.) Clint.:
Sorghum vulgare

TRANZSCHELIA PRUNI-SPINOSAE (Pers.) Diet.:
Prunus angustifolia, Prunus persica, Prunus serotina.

UREDINOPSIS MACROSPERMA (Cke.) Magn.:
Pteridium aquilinum
UREDINOPSIS MIRABILIS (Pk.) Magn.:
Lorinseria areolata

UROMYCES ERAGROSTIDIS Tracy:
Eragrostis capillaris
UROMYCES HALSTEDII DeT.:
Leersia virginica
UROMYCES HEDYSARI-PANICULATI (Schw.) Farl.:
Desmodium laevigatum
UROMYCES HORDEINUS Arth.:
Hordeum pusillum
UROMYCES HYPERICI (Spreng.) Curt.:
Hypericum mutilum
UROMYCES LESPEDEZAE-PROCUMBENTIS (Schw.) Curt.:
Lespedeza frutescens, Lespedeza repens, Lespedeza stuvei
UROMYCES PHASEOLI (Pers.) Wint. var. TYPICA Arth.:
Phaseolus vulgaris
UROMYCES SILPHII (Burr.) Arth.:
Juncus macer
UROMYCES SPERMACOCES (Schw.) Curt.
Diodia teres
UROMYCES STRIATUS Schroet.:
Medicago lupulina

FUNGI IMPERFECTI

ACROSTALAGMUS CINNABARINUS Cda.:
Pandanus variegatus

ACTINONEMA ROSAE (Lib.) Fr.:
Rosa sp.

ALTERNARIA BRASSICAE (Berk.) Sacc.:
Brassica oleracea
ALTERNARIA TENUIS Auct.:
Lonicera fragrantissima
ALTERNARIA SP.:
Berberis aquifolium, Crinum sp., Diodia teres, Hippeastrum sp., Kniphofia uvaria, Magnolia grandiflora, Oenothera biennis, Osmanthus ilicifolius, Populus nigra, Prunus sp., Syringa vulgaris

APOSPHAERIA sp.:
Cassia chamaecrista

ASCOCHYTA sp.:
Pandanus variegatus

BOTRYODIPLODIA MELIAE Ell. & Ev.:
Melia azedarach

CEPHALOTHECIUM ROSEUM Cda.:
Stizolobium deeringianum

CERCOSPORA ADUSTA Heald & Wolf:
Ligustrum japonicum
CERCOSPORA ALTHAEINA Sacc.:
Hibiscus syriacus
CERCOSPORA AMARYLLIDIS Ell. & Ev.:
Amaryllis sp.
CERCOSPORA AMPELOPSIDIS Pk.:
Parthenocissus quinquefolia
CERCOSPORA ASCLEPIODORAE Ell. & Kell.:
Asclepias tuberosa
CERCOSPORA ASIMINAE Ell. & Kell.:
Asimina triloba
CERCOSPORA ATRICINCTA Heald & Wolf:
Zinnia elegans
CERCOSPORA BETICOLA Sacc.:
Beta vulgaris
CERCOSPORA BOEHMERIAE Pk.:
Boehmeria cylindrica
CERCOSPORA BRACHYPUS Ell. & Ev.
Vitis rotundifolia

CERCOSPORA CALLICARPAE Cke.:
Callicarpa americana
CERCOSPORA CARVERIANA Sacc. & D. Sacc.:
Richardsonia pilosa
CERCOSPORA CATALPAE Wint.:
Catalpa bignonioides
CERCOSPORA CATENOSPORA Atk.:
Sambucus canadensis
CERCOSPORA CHRYSANTHEMI Heald & Wolf:
Chrysanthemum indicum
CERCOSPORA CITRULLINA Cke.:
Citrullus vulgaris, Cucurbita pepo.
CERCOSPORA CORNICOLA Tracy & Earle:
Cornus florida
CERCOSPORA CRUENTA Sacc.:
Phaseolus lunatus, Vigna sinensis.
CERCOSPORA ERYTHROGENA Atk.:
Rhexia mariana
CERCOSPORA FLAGELLARIS Ell. & G. Martin:
Phytolacca decandra
CERCOSPORA FRAXINITES Ell. & Ev.:
Fraxinus pennsylvanica
CERCOSPORA HAMAMELIS Ell. & Ev.:
Hamamelis virginiana
CERCOSPORA HELENII Tharp:
Helenium tenuifolium
CERCOSPORA HIBISCI Tracy & Earle:
Hibiscus esculentus
CERCOSPORA LILACIS (Desm.) Sacc.:
Syringa sp.
CERCOSPORA LIRIODENDRI Ell. & Harkn.:
Liriodendron tulipifera
CERCOSPORA LIQUIDAMBARIS Cke. & Ell. ex Atk.:
Liquidambar styraciflua
CERCOSPORA MACLURAE Ell. & Ev.:
Maclura pomifera
CERCOSPORA MALAYENSIS F. L. Stevens & Solh.:
Hibiscus syriacus
CERCOSPORA MALI Ell. & Ev.:
Chaenomeles lagenaria, Malus pumila
CERCOSPORA MELIAE Ell. & Ev.:
Melia azedarach
CERCOSPORA MORICOLA Cke.:
Morus rubra
CERCOSPORA NANDINAE Nagatomo:
Nandina sp.
CERCOSPORA OCCIDENTALIS Cke.:
Cassia marilandica

CERCOSPORA OENOTHERAE Ell. & Ev.:
Oenothera biennis
CERCOSPORA OPULI (Fckl.) Hoehn.:
Viburnum nudum
CERCOSPORA OXYDENDRI Tracy & Earle:
Oxydendrum arboreum
CERCOSPORA PAPAVERI Muller & Chupp:
Papaver sp.
CERCOSPORA PERSONATA (Berk. & Curt.) Ell. & Ev.:
Arachis hypogaea
CERCOSPORA RHUINA Cke. & Ell.:
Rhus glabra, Rhus michauxii
CERCOSPORA RIGOSPORA Atk.:
Solanum nigrum
CERCOSPORA ROSICOLA Pass.:
Rosa sp.
CERCOSPORA RUBI Sacc.:
Rubus villosus, Rubus sp.
CERCOSPORA SCOLECOTRICHOIDES Atk.:
Arundinaria tecta
CERCOSPORA SNELLIANA Reichert:
Morus alba
CERCOSPORA SORGHI Ell. & Ev.:
Sorghum halepense, Zea Mays
CERCOSPORA STIZOLOBII Syd.:
Stizolobium sp.
CERCOSPORA TERNATEAE Petch:
Canavalia ensiformis
CERCOSPORA VERBASCICOLA Ell. & Ev.:
Verbascum thapsus
CERCOSPORA VIOLAE Sacc.:
Viola odorata
CERCOSPORA WEIGELIAE Ell. & Ev.:
Kolkwitzia amabilis
CERCOSPORA sp.:
Crinum sp., Lathyrus polymorphus

CERCOSPORELLA PERSICA Sacc.:
Prunus persica

CEUTHOSPORA sp.:
Sambucus canadensis

CLADOSPORIUM EFFUSUM Berk. & Curt.
Carya pecan
CLADOSPORIUM HERBARUM [Pers.] Lk.:
Cucurbita pepo, Lonicera fragrantissima, Prunus sp., Zea mays
CLADOSPORIUM PAEONIAE Pass. in Thuem. Herb. Myc. Oec.:
Paeonia officinalis

CLADOSPORIUM sp.:
Iris versicolor, Lathyrus polymorphus, Syringa vulgaris

CLASTEROSPORIUM CURVATUM (Berk. & Curt.) Sacc.:
Crataegus clara

COLLETOTRICHUM GLOEOSPORIOIDES Penz.:
Citrus limonia, Ficus elastica
COLLETOTRICHUM GRISEUM Heald & Wolf:
Euonymous japonica
COLLETOTRICHUM OMNIVORUM Halst.:
Pandanus variegatus
COLLETOTRICHUM PHYLLOCACTI Ell. & Ev.:
Epiphyllum sp.

CONIOTHYRIUM sp.:
X Spiraea vanhouttei

CYLINDROSPORIUM BRASSICAE Fautr. & Roum.:
Brassica pekinensis
CYLINDROSPORIUM ULMICOLUM Ell. & Ev.:
Ulmus americana, Ulmus racemosa.
CYLINDROSPORIUM sp.:
Prunus sp.

CYTOSPORA stage of VALSA LEUCOSTOMA (Pers. ex Fr.) Fr.:
Prunus persica

DARLUCA FILUM [Biv.-Bern.] Cast.:
Frommea obtusa, Puccinia sp.

DICHOMERA SAUBINETII (Mont.) Cke.:
Morus alba

DIDYMARIA EFFUSA (Berk. & Curt.) Solh.:
Polygonum pennsylvanicum

DIPLODIA NATALENSIS P. Evans:
Arachis hypogaea, Bryophyllum pinnatum, Catalpa bignonioides, Chenopodium album, Cinnamomum camphora, Diospyros virginiana, Hibiscus esculentus, Pandanus variegatus, Prenanthes altissima, Ricinus communis, Rubus frondosus, Saccharum officinarum, Sambucus canadensis, Xanthium canadense.
DIPLODIA TUBERICOLA (Ell. & Ev.) Taub.:
Ipomoea batatas
DIPLODA ZEAE (Schw.) Lév.:
Zea mays

DISCOSIA ARTOCREAS (Tode ex Fr.) Fr.:
Rubus frondosus

? DOTHIORELLA GLANDULOSA (Cke.) Sacc.:
Robinia hispida
DOTHIORELLA stage of BOTRYOSPHAERIA RIBIS Gross. & Dugg.:
Ailanthus altissima, Ipomoea purpurea, Juniperus virginiana, Ptelea trifoliata

FUSARIUM MONILIFORME Sheldon:
Zea mays
FUSARIUM sp.:
Ambrosia artemisiifolia, Crinum sp., Lathyrus polymorphus, Robinia pseudoacacia

GLOEOSPORIUM BETULARUM Ell. & G. Martin:
Betula nigra
GLOEOSPORIUM RUFOMACULANS (Berk.) Thuem.:
Lathyrus polymorphus
GLOEOSPORIM sp.:
Prunus sp.

HELMINTHOSPORIUM LEUCOSTYLUM Drechs.:
Eleusine indica
HELMINTHOSPORIUM RAVENELII Curt. ap. Berk.:
Sporobolus indicus
HELMINTHOSPORIUM SILIQUOSUM Berk. & Curt.:
Parthenocissus quinquefolia
HELMINTHOSPORIUM TURCICUM Pass.:
Sorghum halepense

HENDERSONIA DESMAZIERI Mont.:
Platanus occidentalis
HENDERSONIA OPUNTIAE Ell. & Ev.:
Opuntia polyacantha
HENDERSONIA sp.:
Cytisus scoparius

HENDERSONULA sp.:
Prunus persica, Robinia hispida, Stizolobium deeringianum

HETEROSPORIUM sp.:
Lathyrus polymorphus

ISARIOPSIS CLAVISPORA (Berk. & Curt.) Sacc.:
Vitis labrusca

MACROPHOMA CANDOLLEI (Berk. & Br.) Berkl. & Vogl.:
Buxus sempervirens
MACROPHOMA TRICHOSANTHIS Syd.:
Trichosanthes anguina

MACROPHOMA VIBURNI Dearn. & House:
Viburnum alnifolium
MACROPHOMA sp.:
Mirabilis jalapa, Nandina domestica, Xanthium canadense

MACROPHOMOPSIS DRACENAE F. L. Stevens & Baechler:
Iris sp.

MACROSPORIUM sp.:
Berberis ilicifolia, Nerium oleander, Platanus occidentalis, Vitis rotundifolia

MARSSONINA POPULI (Lib.) Magn.:
Populus deltoides

MELASMIA HYPOPHYLLA (Berk. & Rav.) Sacc.:
Gleditsia triacanthos

? MONOCHAETIA MALI (Ell. & Ev.) Sacc. & D. Sacc.:
Sassafras albidum
MONOCHAETIA sp.:
Nerium oleander, Sassafras albidum

OVULARIA MACLURAE Ell. & Langl.:
Maclura pomifera
OVULARIA sp.:
Rumex crispus

PERICONIA PYCNOSPORA Fres.:
Citrus trifoliata
PERICONIA sp.:
Zea mays

PESTALOTIA GUEPINI Desm.:
Magnolia grandiflora
PESTALOTIA INSIDENS Zabriskie:
Ulmus racemosa
PESTALOTIA PEREGRINA Ell. & G. Martin:
Pinus nigra
PESTALOTIA QUERCINA Guba:
QUERCUS RUBRA
PESTALOTIA STICTICA Berk. & Curt.:
Platanus occidentalis
PESTALOTIA sp.:
Carya pecan, Diodia teres, Ludvigia alternifolia, Oenothera biennis, Spiraea sp., Viburnum tinus.

PHLEOSPORA MACULANS (Bereng.) Allesch.:
Morus rubra

PHOMA ASPARAGI Sacc.:
Asparagus officinalis
PHOMA sp.:
Allamanda hendersonii, Canna indica, Chenopodium album, Diodia teres, Sassafras albidum

PHYLLOSTICTA BATATAS (Thuem.) Cke.:
Ipomoea batatas
PHYLLOSTICTA CONCENTRICA Sacc.:
Hedera helix
PHYLLOSTICTA MAHONIANA (Sacc.) Allesch.:
Berberis aquifolium
PHYLLOSTICTA MAHONIAECOLA Pass. ap. Brun.:
Berberis aquifolium
PHYLLOSTICTA sp.:
Camellia japonica, Iris versicolor, Lonicera fragrantissima, Pittosporum tobira

PIRICULARIA EUPHORBIAE (Tracy & Earle) Atk.:
Euphorbia preslii

PODOSPORIUM RIGIDUM Schw.:
Parthenocissus quinquefolia

POLYTHRINCIUM TRIFOLII G. Kunze ex Grev.:
Trifolium hybridum

RAMULARIA ARECLA Atk.:
Gossypium sp.
RAMULARIA COLEOSPORII Sacc.:
Silphium sp.
RAMULARIA DECIPIENS Ell. & Ev.:
Rumex crispus
RAMULARIA SIDAE Olive:
Sida spinosa

SEPTOGLOEUM PROFUSUM (Ell. & Ev.) Sacc.:
Ulmus racemosa

SEPTORIA HELIANTHI Ell. & Kell.
Helianthus annuus
SEPTORIA LYCOPERSICI Speg.:
Lycopersicum esculentum
SEPTORIA SAMBUCINA Pk.:
Sambucus canadensis

SHEARIA MAGNOLIAE (Shear) Petr.:
Magnolia grandiflora

SPHAEROPSIS ELAEAGNINA Fairm.:
Elaeagnus angustifolia
SPHAEROPSIS MALORUM Pk.:
Allamanda hendersonii, Arachis hypogaea, Broussonetia papyrifera, Citrus trifoliata, Ficus carica, Hedera helix, Hibiscus syriacus, Jasminum mesnyi, Ligustrum sp., Lindera benzoin, Maclura pomifera, Malus floribunda, Mirabilis jalapa, Nyssa sylvatica, Osmanthus ilicifolius, Platanus occidentalis, Prunus sp., Ptelea trifoliata, Pyrus communis, Robinia hispida, Sassafras albidum, Sida spinosa, Stizolobium deeringianum, Viburnum alnifolium.
SPHAEROPSIS PINASTRI Cke. & Ell.:
Cedrus deodara
SPHAEROPSIS SIMILLIMA Pk.:
Acer saccharinum
SPHAEROPSIS sp.:
Opuntia polyacantha, Populus deltoides.

TETRAPLOA ARISTATA Berk. & Br.:
Ligustrum sp., Saccharum officinarum

TUBERCULARIA VULGARIS Tode ex Fr.:
Erythrina herbacea
TUBERCULARIA sp.:
Stizolobium deeringianum

VERMICULARIA COMPACTA Cke. & Ell.:
Dahlia sp.
VERMICULARIA DEMATIUM (Pers. ex Fr.) Fr.:
Amaranthus spinosus, Anthemis cotula, Arachis hypogaea, Crotalaria sericea, Hibiscus esculentus, Liriodendron tulipifera, Melilotus alba, Sambucus canadensis, Vinca rosea.
VERMICULARIA LILIACEARUM West.:
Aspidistra lurida, Hippeastrum sp., Iris cristata
VERMICULARIA POLYTRICHA Cke.:
Canavalia sp.
VERMICULARIA SUBEFFIGURATA Schw. var. SCAPINCOLA Schw.:
Yucca filamentosa
VERMICULARIA sp.:
Cucurbita pepo, Erythrina herbacea, Iris versicolor, Vernonia fasciculata

XENOSPORELLA BERKELEYI (Curt.) Linder:
Ambrosia artemisiifolia, Arundo donax, Nyssa sylvatica

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3. _____. Destructive occurrence of Diplodia on okra stalks in Alabama. Plant Disease Reporter 26:75. 1942.

4. (Miller, Paul R.) Rusts of Alabama. Plant Disease Reporter 17:168. 1933.

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DIVISION OF MYCOLOGY AND DISEASE SURVEY

CHECK LIST REVISION

Freeman Weiss

ECHINACEA (COMPOSITAE)

ECHINACEA PURPUREA (L.) Moench, PURPLE CONEFLOWER. Hardy perennial herb of the Eastern and South Central States, grown as a garden flower.

Cercospora rudbeckii Pk., leaf spot. Iowa
Septoria lepachydis Ell. & Ev., leaf spot. Wis.

Mosaic -- unidentified virus. N.Y.

ECHINOPS (COMPOSITAE)

ECHINOPS sp., GLOBE-THISTLE. Coarse perennial herb of Europe, sometimes grown in wild gardens.

Sclerotium rolfsii Sacc., crown rot. Conn.

EMILIA (COMPOSITAE)

EMILIA SAGITTATA DC., TASSELFLOWER (1) and E. SONCHIFOLIA DC., FLORA'S-PAINTBRUSH (2). Annual herbs, widely distributed in tropical regions, and commonly grown as garden flowers.

Heterodera marioni (Cornu) Goodey, root knot. Hawaii (1,2)
Pratylenchus pratensis (DeMan) Filip., root nematode. Hawaii (1,2)
Puccinia emiliae P.Henn. (III), rust. Fla. (1,2); P.R., Virgin Is. (2)
Sclerotium rolfsii Sacc., stem rot. Hawaii (2)

Mosaic -- virus. In part Marmor cucumeris Holmes, Cucumis virus 1 K.M.Sm., Fla. (1); in part unidentified, Hawaii (2). Systemic infection from inoculation with tobacco mosaic virus is also reported.
Spotted wilt, yellow spot -- virus (Lethum australiense Holmes), Lycopersicon virus 3 K.M.Sm.). Calif. (1), Hawaii (2)

ENCELIA. See PDR. 25: 137. 1941.

ENGELMANNIA (COMPOSITAE)

ENGELMANNIA PINNATIFIDA Torr. & Gray, ENGELMANN DAISY. Perennial herb of the Southwestern Plains, sometimes grown in gardens.

Synchytrium taraxaci DBy. & Wor., leaf gall. Tex.

ERECHTITES (COMPOSITAE)

ERECHTITES HIERACIFOLIA (L.) Raf., FIREWEED (1). Coarse annual growing on waste ground, and in woodlands after fires, throughout the U.S.; useful to wildlife. Also E. VALERIANIFOLIA DC. (2) of Brazil, adventive in Hawaii.

Bremia lactucae Regel, downy mildew. Pa. (1)
Cercospora erechtitis Atk., leaf spot. Ala., Fla., Tex. (1)
Ditylenchus dipsaci (Kuehn) Filip., stem nematode. N.Y. (1)
Erysiphe cichoracearum DC., powdery mildew. Md. (1)
E. polygoni DC. N.Y. (1)
Heterodera marioni (Cornu) Goodey, root knot. Hawaii (1,2)
Phyllosticta erechtitis F.L. Stevens and E. Young, leaf spot. Hawaii (2)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (1)
Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. Ill., Md., Mass., N.J., Tex., Wis. (1)
Sclerotinia sclerotiorum (Lib.) DBy., stem rot. Fla. (1)
Sclerotium rolfsii Sacc., stem rot. Fla. (1)
Septoria erechtites Ell. & Ev., leaf spot. Del., Tex., Wis., Alaska (1)
Sphaerotheca humuli (DC.) Burr., powdery mildew. N.J. to Ala., Ill. and Minn.; Mont.; also var. fuliginea (Schlecht.) Salm. in Iowa, Mich., Pa., Wis. (1).

Yellow spot -- virus (Lethum australiense Holmes, Lycopersicon virus 3 K.M.Sm.). Hawaii (2)

ERIGERON (COMPOSITAE)

ERIGERON spp. (annual) as E. ANNUUS (L.) Pers., DAISY FLEABANE (1), E. CANADENSIS L., HORSEWEED (2), and E. STRIGOSUS Muhl. (3). Widely distributed native plants, of minor importance as weeds.

Basidiophora entospora Roze & Cornu, downy mildew. Ind. (1); Tex. (1,2); Ill. (2,3); Mo., N.Car., Wis. (3)
Cercospora cana Sacc., leaf spot. Eastern and Central States to Miss., Tex. and Nebr. (1,2,3). C. griseëla Pk., reported in Ill., Iowa, Mich., N.Y., and Tex., is doubtfully distinct.

ERIGERON cont.

Cuscuta cuspidata Engelm., dodder. Okla. (2)
Diaporthe arctii (Lasch) Nits., on stems. N. J. (1,2)
Diaporthopsis apiculosa (Ell.) Wehm., on stems. N. J. (2)
Dimeriella erigeronicola F.L.Stevens, black mildew. P. R. (2)
Ditylenchus dipsaci (Kuehn) Filip., stem nematode. N. Y. (2)
Erysiphe cichoracearum DC., powdery mildew. Md. (1); Tex. (1,2); Mont. (2,3); N. Car. (3)
Heterodera marioni (Cornu) Goodey, root knot. Hawaii (2)
Leptothyrium punctiforme Berk. & Curt., on leaves. N. Y. (1); Wis. (1,3); W. Va. (3). L. deernessii Bub., Tex. (1,2)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (1,2)
Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. Wis. (1), Tex. (1,2)
Puccinia cyperi Arth. (0,I), rust. N. Y to Md., Tex. and Wis. (1, 2,3). II and III on Cyperus spp.
P. extensicola Plowr. var. erigerontis Arth. (0,I). Mass. to Miss., Tex., and S. Dak. (1,2,3). II and III on Carex spp.
Ramularia macrospora Fres., leaf spot. Ill., N. J., N. Car., Tenn. (1); Tex. (1,2)
Sclerotium bataticola Taub., charcoal rot. Ill. (2)
S. rolfsii Sacc., southern blight. Fla. (2)
Septoria erigerontis (erigeronis) Pk., leaf spot. N. Y. to Miss., Tex., and Wis. (1,2,3)
Sphaerotheca humuli (DC.) Burr., powdery mildew. Pa. (1); Md., Mont. (2). Var. fuliginea (Schlecht.) Salm., Mich., Pa. (1); Iowa (2)

Mosaic -- unidentified virus. Tex. (2)
Spotted wilt -- virus (Lethum australiense Holmes, Lycopersicon virus 3 K.M.Sm.). Hawaii (2)
Yellows -- virus (Chlorogenus callistephi Holmes, Callistephus virus 1 K.M.Sm.). N. Y. to Ga., Okla., and Kans. (1,2,3). Also var. californicus Holmes, Calif. (2)

ERIGERON spp. (Perennial), as E. GLABELLUS Nutt. (1), E. PHILADELPHICUS L. (2), E. PULCHELLUS Michx. (3), E. SALSUGINOSUS A.Gray (4), E. SPECIOSUS DC. (5), and others (6). Native herbs of the Eastern and Central States (1,2,3) or the far West (4,5); sometimes grown in wild gardens or cultivated, especially (5)

Basidiophora entospora Roze & Cornu, downy mildew. La. (2), Ill. (6)
Botrytis cinerea Pers. ex Fr., gray-mold blight. Alaska (6)
Cercospora cana Saco., leaf spot. La. (2); P. R. (6)
Cercosporella colubrina Ell. & Ev., leaf spot. Wash. (4)
Coleosporium solidaginis (Schw.) Thuem. (II,III), rust. Calif., Alaska (6). 0 and I on Pinus spp.
Diaporthe arctii (Lasch) Nits., on stems. N. J. (6)

ERIGERON cont.

Dimeriella erigeronicola F.L.Stevens, black mildew. P. R. (6)
Entyloma compositarum Farl., white smut. Mich., N. Dak., Wis. (2); Wash., Wyo. (4); Ill., Utah, Wash. (6)
Erysiphe cichoracearum DC., powdery mildew. Mont. (1,6); Colo., Mich., N. Mex., Pa., S. Dak., Wyo. (6)
Leptothyrium dearnessii Bub., (? L. punctiforme Berk. & Curt.), on leaves. N. Y. (2)
Mycosphaerella sp. (Sphaerella subcongregata Ell. & Ev.), on stems, Wash. (4)
Phyllactinia corylea Pers. ex Karst., powdery mildew. Wash. (6)
Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. Md. (2), Iowa (6)
Puccinia cyperi Arth. (0,I), rust. Mo. (3). II and III on Cyperus spp.
P. extensicola Plowr. var. erigerontis Arth. (0,I), rust. Commonly on (2) and (3) in the Eastern and Central States; on (4) and (5) in the Pacific Coast States; also on other spp.
P. grindeliae Pk. (0,III). Utah (4,6); Colo., Nev., Wyo. (6)
P. stipae Arth. (0,I). Colo., Wyo. (6). II and III on Stipa and other grasses.
Sclerotium rolfsii Sacc., stem rot. Ill. (1)
Septoria erigerontis Pk., leaf spot. Ind., Iowa, Kans. (2); N. Y. (2,3); Ohio (3); Me. to Md., Nebr., and Mich. (6)
Sphaerotheca humuli (DC.) Burr. var. fuliginea (Schlecht.) Salm., powdery mildew. Ind., N. Y., Alaska (6)
Synchytrium erigeronii M.T.Cook, leaf gall. La. (2)
Verticillium albo-atrum Reinke & Berth., wilt. Mass. (6)

Mosaic -- unidentified virus. Ind. (6)
Yellows -- virus (Chlorogenus callistephi Holmes, Callistephus virus 1 K.M.Sm.). Occasional on 1, 5, and 6; reported in Md., Miss., N. J., N. Y., Kans., Okla. Also var. californicus Holmes, Calif. (6)

ERIOPHYLLUM (COMPOSITAE). See PDR 25: 139. 1941

EUPATORIUM (COMPOSITAE)

EUPATORIUM spp., BONESET, THOROUGHWORT. Mostly perennial herbs, numerous in tropical America; some are grown under glass for cut flowers, and some of the U. S. spp. are grown in wild gardens, as E. COELESTINUM L., MISTFLOWER (1), E. PERFOLIATUM L., BONESET (2), E. PURPUREUM L., JOE-PYE WEED (3), and E. RUGOSUM Houtt. (E. urticaefolium Reich.) WHITE SNAKEROOT (4), others (5). Some are useful to wildlife; (2) and (4) are reputedly poisonous to livestock.

EUPATORIUM cont.

Ascochyta compositarum J.J.Davis, leaf spot. W. Va. (3); Wis. (3, 4).

Botrytis cinerea Pers. ex Fr., gray-mold blight. N. J. (5)

Cercospora ageratoides Ell. & Ev., leaf spot. N. J., W. Va., Wis. (4); Ala., Miss., N. J., Tex. (5)

C. eupatorii Pk. Ind. (2,3); N. J. (4); Ala., N. Y. (5)

C. perfoliata Ell. & Ev. Ill. (4,5); Mich. (2); Wis. (2,3,4,5)

Cionothrix praelonga (Wint.) Arth. (0,III), rust. Canal Zone (5)

Coleosporium eupatorii Arth. (II,III), rust. P. R. (5). 0 and I unknown

Diaporthe arctii (Lasch) Nits., on stems. Ga. (3,4,5)

Entyloma compositarum Farl., white smut. Ill., Iowa, Miss., W. Va., Wis. (4)

Erysiphe cichoracearum DC., powdery mildew. General in the Eastern and Central States to Tex. and Minn. (2,3,4,5); P. R. (5). E. galeopsidis DC. is reported on (4) in Ill. and Wis., but its distinctness from E. cichoracearum is doubtful

Fusarium sp., wilt. N. J. (5)

Heterodera marioni (Cornu) Goodey, root knot. Ala. (5)

Meliola compositarum Earle, and M. sororcula Speg., black mildew. P. R. (5)

Mycosphaerella sp., on stems. Ga. (3)

Pezizella oenotherae (Cke. & Ell.) Sacc., on stems. Md. (5)

Phaeodothiopsis eupatoriae F.L.Stevens, black spot. P. R. (5)

Phyllosticta decidua Ell. & Kell., leaf spot. Wis. (2).

P. eupatoriicola Kab. & Bub., P. R. (5)

P. eupatorina Thuem., Ill., N. J. (3)

Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (1,4,5)

Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. N.Y. to Md., Mo., and Wis. (3); Kans., Tex., W. Va., Wis. (4)

Puccinia conoclinii Seym. (II,III), rust. Md. to Ala., Tex., and Ill. (1); Ariz., Fla., Ill., Ind., La., P. R. (5). 0 and I unknown.

P. eleocharidis Arth.(0,I). Widespread on (2) and (3) in the Eastern and Central States to Ala., Tex. and Wyo.; Va. W. Va. (4); also on other spp. in this range. II and III on Eleocharis spp.

P. tenuis [Schw.] Burr. (0,I,III). Mass. to N. Car., Nebr., and Minn. (4)

P. tolimensis Mayor (III). N. Y. (4)

Ramularia dispar J.J.Davis, on old leaves. Ill. (5); Tex. (4); Wis. (3,4)

Rhizoctonia solani Kuehn, root and stem rot. N. J. (5)

Robledia tetraspora Chardon, black spot. P. R. (5)

Sclerotium rolfsii Sacc., stem rot. Conn. (1); Ill., Tex. (4); Ill., Md., N. J. (5)

Septoria eupatorii Rob. ex Desm., leaf spot. Ill. (1); Miss. (2); Tex. (4); La., Miss., Tex. (5). (? Conidial stage of Myco-

EUPATORIUM cont.
sphaerella eupatoriicola Petr.)
Septoria eupatoriicola Tehon, Ill. (2)

Yellows -- ? virus (distinct from aster yellows virus). Central States (2). The susceptibility of (2) and (4) to aster yellows virus, Chlorogenus callistephi Holmes, has been experimentally demonstrated.

GAILLARDIA (COMPOSITAE)

GAILLARDIA ARISTATA Pursh, GAILLARDIA (1). Native perennial herb of the far Western States; selected forms are grown in gardens. G. PULCHELLA Foug., FIRE-WHEEL (2), an annual of the Southwestern States, also is grown for ornament and is useful to wildlife.

Entyloma polysporum (Pk.) Farl., white smut. Minn.(1); Kans., Nebr. (2)
Erysiphe cichoracearum DC., powdery mildew. Mont., Tex. (1)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (1,2)
Puccinia gaillardiae (Diet. & Holw.) Barth. (0,I), rust. Calif. (1). II and III unknown
Pythium ultimum Trow, root rot. Calif. (1)
Septoria gaillardiae Ell. & Ev., leaf spot. Iowa, Okla., Tex. (1, 2); Kans. Mo. (2)
Sphaerotheca humuli (DC.) Burr., var. fuliginea (Schlecht.) Salm., powdery mildew. Mont., Wash., Wyo. (1)

Spotted wilt -- virus (Lethum australiense Holmes, Lycopersicon virus 3 K.M.Sm.). Calif. (1)
Yellows -- virus (Chlorogenus callistephi Holmes, Callistephus virus 1 K.M.Sm.). N. J., N. Y., Pa. (1). Var. californicus Holmes, Callistephus virus 1A K.M.Sm. Calif. (2)

GALINSOGA (COMPOSITAE)

GALINSOGA PARVIFLORA Cav. (1), QUICKWEED. Annual herb of tropical America, widely distributed in waste ground throughout the U. S., a weed in cultivated ground.

Ditylenchus dipsaci (Kuehn) Filip., stem nematode. N. Y.
Heterodera marioni (Cornu) Goodey, root knot. Hawaii

Spotted wilt -- virus (Lethum australiense Holmes, Lycopersicon virus 3 K.M.Sm.), Hawaii
Yellows -- virus (Chlorogenus callistephi Holmes, Callistephus

GALINSOGA cont.
virus 1 K.M.Sm.). N. Y. Also var. californicus Holmes in Calif.

GERBERA (COMPOSITAE)

GERBERA JAMESONII Bolus, TRANSVAAL DAISY. Perennial herb of S. Africa grown under glass as a cut flower in the North, and in gardens in the South and Calif.

Botrytis cinerea Pers. ex Fr., gray-mold blight. Fla., N. Y.
Erysiphe cichoracearum DC., powdery mildew. Calif., Okla.
Gloeosporium sp. (? Glomerella cingulata (Ston.) Spauld. & Schrenk), leaf spot, stem rot. N. Y.
Heterodera marioni (Cornu) Goodey, root knot. Calif., Fla., Md., Hawaii, N. Y., N. Car.
Phytophthora sp., root and stem rot. Calif., N. J., N. Y. P. cryptogea Pethyb. & Laff. and P. drechsleri Tucker identified in Calif.
Sclerotinia sclerotiorum (Lib.) DBy., crown rot. Md., N. Y.

GNAPHALIUM (COMPOSITAE)

GNAPHALIUM spp., CUDWEED, as G. DECURRENS Ives (1), G. PURPUREUM L. (2), other spp. (3). Low annual or biennial herbs, widely distributed in waste ground, some useful to wildlife, occasionally grown as everlasting flowers.

Cercospora gnaphaliacea Cke., leaf spot. Miss. (2,3); Kans., Tex., Wis. (3)
C. gnaphalii Harkn., Calif. (1); Tex. (3)
Cylindrosporium gnaphalicola Atk., leaf spot. Ala., Tex. (3)
Entyloma compositarum Farl., white smut. Ala., ? Md. (3)
Heterodera marioni (Cornu) Goodey, root knot. Hawaii (3)
Mycosphaerella bakeri Rehm, on stems. Calif. (3)
Phoma erysiphoides Ell. & Ev., stem canker. Tex.
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (3)
Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. Ala. (2); Miss. (2,3)
Puccinia gnaphalii (Speg.) P. Henn. (II,III), rust. Ala., La., S. Car. (2); Ala., N. Car. (3). O and I unknown
P. investita Schw. (O,I,III), rust. Ariz., N. Y., Vt., Wis. (1); Calif., Conn., Mass., N. Y., Pa., Tenn., W. Va. (3)
Septoria cercosperma Rostr., leaf spot. Tex. (3)

Yellows -- virus (Chlorogenus callistephi var. californicus Holmes, Callistephus virus 1A K.M.Sm.). Calif. (1,3)

GRINDELIA (COMPOSITAE)

GRINDELIA SQUARROSA (Pursh) Dunal, GUMWEED (1); other spp. (2). Coarse perennials of the Western States; (1) is widely distributed in waste ground, some are grown for ornament, several are useful to wildlife.

Cercospora grindeliae Ell. & Ev., leaf spot. Tex. (1); Calif., Wis. (2)
Coleosporium solidaginis (Schw.) Thuem. (II,III), rust. Colo., Wis. (1); Calif., Wash. (2). 0 and I on Pinus spp.
Erysiphe cichoracearum DC., powdery mildew. Minn. to N. Mex., Calif., and Mont. (1,2)
Phoma leptospora Sacc., on stems. Tex. (1)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (2)
Puccinia extensicola Plowr. var. solidaginis (Schw.) Arth. (0,I), rust. Kans., Nebr. Tex. (1). II and III on Carex spp.
P. grindeliae Pk. (III). Nebr. to Tex., Calif., and Mont. (1,2)
P. stipae Arth. (0,I). Colo., Kans., Nebr., N. & S. Dak. (1). II and III on Stipa spp. and other grasses.
Ramularia grindeliae Ell. & Kell., on old leaves. Kans. (1,2); Tex. (1); N. Mex. (2)
Septoria grindeliae Ell. & Barth., leaf spot. Colo., Kans., Tex. (1); Ore. (2)
S. grindeliicola Greene, Wis. (1)
Thecaphora californica (Harkn.) Clint., inflorescence smut. Utah (1); Calif. (2)
T. cuneata (Schofield) Clint., inflorescence smut. Colo., Kans., Nebr., N. Mex. (1); Nebr. (2)
Uromyces junci (Desm.) L.Tul. (0,I), rust. Calif. II and III on Juncus spp.

GUTIERREZIA (COMPOSITAE)

GUTIERREZIA SAROTHRAE (Pursh) Britton & Rusby, MATCHWEED (1); other spp. (2). Shrubby herbs of the Western Plains, some useful to wildlife.

Coleosporium solidaginis (Schw.) Thuem. (II,III), rust. Tex. (2)
Diplodina coloradensis Ell. & Ev., on stems. Colo. (1); Tex. (2)
Erysiphe cichoracearum DC., powdery mildew. Colo., Mont., Tex. (1,2)
E. polygoni DC., Mont. (1)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (2)
Puccinia grindeliae Pk. (III), rust. N. Dak. to Tex., Calif., and Utah (1,2)
P. stipae Arth. (0,I). Mont., Nebr., N. Mex. (1); Tex. (1,2)
Rhabdospora guttierreziae Earle, on stems. Colo. (2)

HELENIUM (COMPOSITAE)

HELENIUM spp., SNEEZEWEED, as H. AUTUMNALE L. (1) and H. TENUIFOLIUM Nutt. (2); other spp. (3). Coarse perennial (1) or annual (2) herbs of plains and prairies, mostly in the Southern and Western States; the perennial types sometimes grown in gardens and useful to wildlife; (1) an occasional weed

Cercospora helenii Tharp, leaf spot. Ala. (2), Tex. (3)
Entyloma compositarum Farl. (E. helenii Cif.), leaf smut. Tex., Wis. (1)
E. polysporum (Pk.) Farl., Mont. (1)
Erysiphe cichoracearum DC., powdery mildew. Colo., Mont., Ore., Utah, Wash., Wis., Wyo. (1,3); Tex. (2)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (1,2)
Puccinia conspicua [Arth.] Mains (O,I), rust. Ariz., Colo., N. Mex. (3). II and III on Koeleria cristata (L.) Pers.
P. extensicola Plowr. var. solidaginis (Schw.) Arth. (O,I), rust. Nebr., Tex. (1); Colo., Nebr. (3). II and III on Carex spp.
Septoria helenii Ell. & Ev., leaf spot. Tex. (1,2); Iowa, Pa. (3)

Yellows -- virus (Chlorogenus callistephi var. californicus Holmes, Callistephus virus 1A K.M.Sm.). Calif. (2)

HELIANTHUS (COMPOSITAE)

HELIANTHUS spp. (annual), SUNFLOWER, especially H. ANNUUS L., COMMON S. (1); H. ARGOPHYLLUS Torr. & Gray (2), H. DEBILIS Nutt. (3), and H. PETIOLARIS Nutt., PRAIRIE S. (4). Annual herbs of the Western (1,4) or Southern (2,3) States; (1) is widely cultivated in selected forms for ornament, also for silage and oil-bearing seed; with (4) useful to wildlife.

Agrobacterium tumefaciens (E.F.Sm. & Town.) Conn, crown gall. As experimental host (1)
Albugo tragopogonis Pers. ex S.F.Gray, white rust. Wis. (1)
Armillaria mellea Vahl ex Fr., root rot. Ore. (1)
Botrytis cinerea Pers. ex Fr., gray-mold blight, bud rot. Calif., Ore. (1)
Cercospora pachypus Ell. & Kell., leaf spot. Ala., Kans., Okla., Tex. (1); Kans. (4)
Cuscuta sp., dodder. Okla., Tex., Wash. (1)
Diaporthe arctii (Lasch) Nits., on stems. Nebr. (1)
Entyloma polysporum (Pk.) Farl., leaf smut. Mont. (1)
Erysiphe cichoracearum DC., powdery mildew. General (1); Iowa (3, 4); Mich. (4)
Heterodera marioni (Cornu) Goodey, root knot. Ala., Tex., W. Va., Hawaii (1); ? Fla. (3)

HELIANTHUS cont.

Macrophomina phaseoli (Maubl.) Ashby, charcoal rot. Md. (1)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (1,4)
Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. N. Y. to Md., Kans., and Mont. (1); Tex. (2)
Pseudomonas solanacearum E.F.Sm., bacterial wilt. P. R. (1)
Puccinia helianthi Schw. (0,I,II,III), rust. General (1,4); Calif., Fla., Iowa, Tex. (3)
Pythium debaryanum Hesse, root rot. N. Dak. (1)
P. irregulare Buis. and P. splendens Braun, Hawaii (1)
Rhabdospora helianthicola (Cke. & Harkn.) Sacc., on stems. Calif. (1)
Rhizoctonia crocorum (Pers.) DC. ex Fr., violet root rot. Tex. (1)
R. solani Kuehn, root and stem rot. Ill., Md., Nebr., N. Y., Wis. (1)
Sclerotinia sclerotiorum (Lib.) DC., stem rot, wilt. Widespread, reported in Northeastern, North Central, and Pacific States (1)
Sclerotium rolfsii Sacc., southern blight. La., Tex., P. R. (1)
Septoria helianthi Ell. & Kell., leaf spot. Conn. to Miss., N. Mex. and Mont.; general in the Middle West (1); Tex. (2); Minn., Mont. (4)
Tylenchus balsamophilus Thorne, leaf gall. Wash. (1)
Uromyces junci (Desm.) L.Tul. (0,I), rust. Nebr. (1), Okla. (4). II and III on Juncus spp.

HELIANTHUS spp. (perennial), as H. ATRORUBENS L., DARKEYE SUNFLOWER (1); H. DECAPETALUS L., THINLEAF S. (2); H. GIGANTEUS L., GIANT S. (3); H. MAXIMILIANII Schrad (4); H. MOLLIS Lam., ASHY S. (5); H. RIGIDUS (Cass.) Desf., STIFF S. (6); other spp. (7)
Coarse herbs of plains, meadows, and open woodlands; 1, 2, 3, and 5 mostly in the Eastern and Southern States, 4 and 6 in the Central States southward and west. Those listed are sometimes grown for ornament, several are useful to wildlife.

Albugo tragopogonis Pers. ex S.F.Gray, white rust. Ill., Mo. (7)
Ascochyta compositarum J.J.Davis, leaf spot. Wis. (7)
Cercospora helianthi Ell. & Ev., leaf spot. Tex. (4); Ill., Kans. (6); Kans., Mo., Ohio, Wis. (7)
Coleosporium helianthi (Schw.) Arth. (II,III), rust. N. Y. to Fla., La., and Ind. (2,3); Okla. (6); also various other spp. in this range and west to Minn. 0 and I on Pinus echinata Mill. and P. virginiana Mill.
Colletotrichum helianthi J.J.Davis, leaf spot. Wis. (7)
Cuscuta sp., dodder. Okla., Tex. (7)
Diaporthe arctii (Lasch) Nits., on stems. Ga. (1,7)
Erysiphe cichoracearum DC., powdery mildew. Conn. to Ga., Tex., and Mont., on all listed spp. and others within their range.
Gibberidea heliopsidis (Schw.) Shear, black patch on leaves and stems. Wis. (6,7); Ga., Ill., Miss., Mo., ? Mont., N. Car., Va. (7)

HELIANTHUS cont.

Mycosphaerella sp., on stems. Ga. (7)
Phyllachora ambrosiae (Berk. & Curt.) Sacc., on stems. N. Mex. (4, 7); ? Calif., Wyo. (7)
Phyllosticta helianthi Ell. & Ev., leaf spot. Wis. (7)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (4,7)
Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. Chiefly in the Central States from Ill. to Kans. and N. Dak. (3,4,6,7); also N. Y., Tex., Mont., Wyo. (7)
Pseudomonas solanacearum E.F.Sm., bacterial wilt. Fla. (7)
Puccinia helianthi Schw. (0,I,II,III), rust. Throughout the U. S. on all spp. listed and many others.
P. massalis Arth. (0,I,II,III), rust. On H. ciliaris DC. in N. Mex. and Tex.
Ramularia helianthi Ell. & Ev., on leaves. Calif., Wash. (7)
Septoria helianthi Ell. & Kell, leaf spot. W. Va. (2,3); Ohio to Okla. and Minn. (6,7)
S. inulae Sacc. & Speg., Ill. (5)
S. paupera Ell., N. J. (7)
Uromyces junci (Desm.) L.Tul. (0,I), rust. Nebr. (2,4); N. Dak. (4); Kans., Nebr., S. Dak. (6); Calif., Wyo. (7)
U. silphii [Burr.] Arth. (0,I). N. Y. (3,7); Ill., Mo., Tenn., Wis. (7)

Mosaic -- unidentified virus. Ind. (7)

HELIANTHUS TUBEROSUS L., JERUSALEM ARTICHOKE. Coarse perennial of eastern U. S. to Ga. and Kans., cultivated for edible tubers.

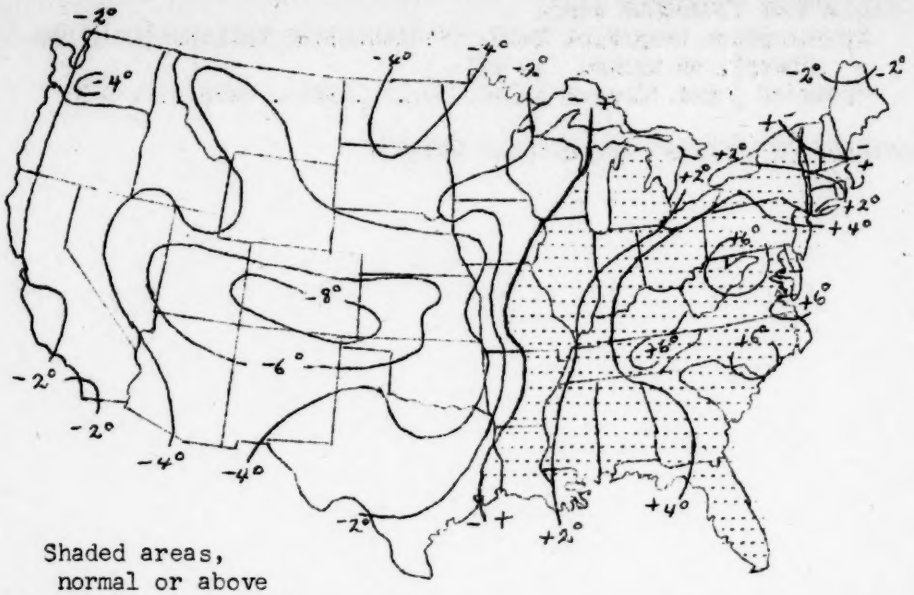
Cercospora helianthi Ell. & Ev., leaf spot. Kans.
Coleosporium helianthi (Schw.) Arth. (II,III), rust. Ala., Ill., ? Minn., N. Y., N. & S. Car., Okla., Pa., Tenn., Va.
Erysiphe cichoracearum DC., powdery mildew. Mass. to Ga., Tex., and N. Dak.; Wash.
Heterodera marioni (Cornu) Goodey, root knot. Calif., Fla., Md., N. Y., S. Car., Tenn.
Phymatotrichum omnivorum (Shear) Dug., root rot. Ariz., Tex.
Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. Vt. and N. J. to Kans. and S. Dak.
?Pseudomonas helianthi (Kawamura) Burkh., bacterial spot. Ill.
Puccinia helianthi Schw. (0,I,II,III), rust. Me. to Ga., Tex., and N. Dak.
Rhizopus stolonifer (Ehr. ex Fr.) Lind, soft rot of tubers. Minn.
Sclerotinia sclerotiorum (Lib.) DBy., stem rot, wilt. Mass., Minn., Wash.
Sclerotium rolfsii Sacc., southern blight. Fla., La., Miss., S. Car., Tex.
Septoria helianthi Ell. & Kell., leaf spot. Ill., Wis.

HELIANTHUS TUBEROSUS conc.

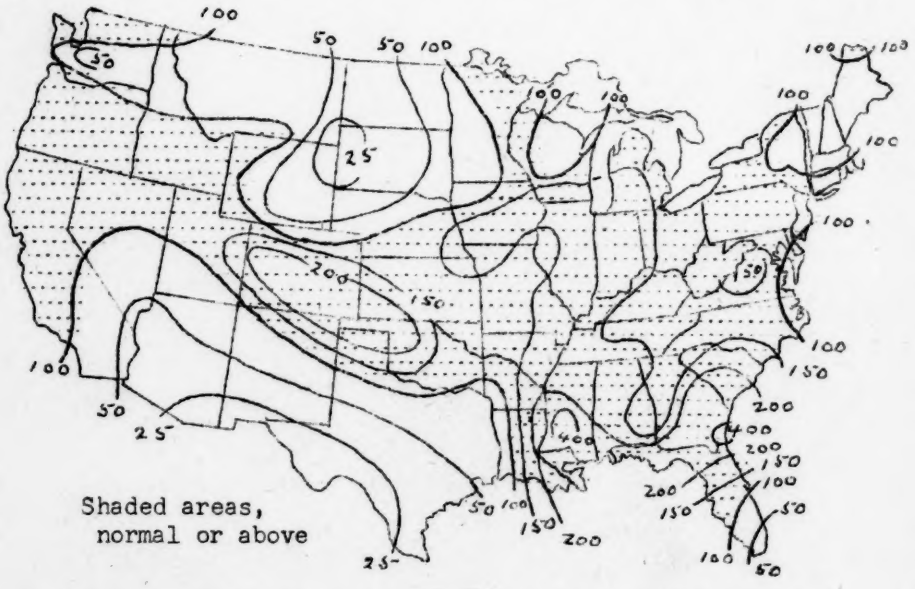
Sphaerophoma brencklei Petr. (? Gibberidea heliopsidis (Schw.) Shear), on stems. N. Dak.

Uromyces junci (Desm.) L.Tul. (O,I), rust. Nebr., N. Dak.

DIVISION OF MYCOLOGY AND DISEASE SURVEY



Map I. Departure of mean temperature from normal, March 1948



Map II. Percentage of normal precipitation, March 1948

MARCH WEATHER

From U. S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for week ending April 6, 1948.